CHAPTER 3
AFFECTED ENVIRONMENT

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3.1 INTRODUCTION

3.1.1 Organization

This section of this Environmental Impact Statement (EIS) describes the existing conditions at DTA East, providing a basis for identifying and evaluating the environmental effects of the proposed action. This EIS focuses primarily on those issues that were identified as major concerns during the scoping processes, both during the development of the preceding Environmental Assessment (EA) and this EIS (see Section 1.9, *Issues Identified During the Scoping Process* and Table 3.1.1.a), as well as the community concerns expressed in the litigation that prompted this EIS:

- Issue 2: Soil Resources
- Issue 3: Surface Water
- Issue 4: Fire Management
- Issue 5: Noise
- Issue 6: Human Health and Safety
- Issue 7: Wildlife and Fisheries
- Issue 8: Cultural Resources

Issue 1, Site criteria, or selection of the site, is discussed in Chapter 2, Section 2.2, *Detailed Description of the Alternative*s. Issue 9, Army commitments to mitigations, is discussed in Chapter 4, Section 4.5, *Reasonable and Practicable Mitigations*.

While this document will primarily focus on those major issues identified through public participation, the remainder of the potential issues and resource categories (Table 3.1.1.b) will also be addressed in this EIS. As initial and subsequent scoping indicated that none of the alternatives would have any effect on geologic resources, such analyses are not included in this document. The conditions at each alternative site (Eddy Drop Zone, Donnelly Drop Zone, and North Texas Range) are described within subsections of each resource category.

Table 3.1.1.a Primary Issues of Concern

Section	Resource Category	Page Number
3.2.1	Soil Resources (**Issue 2:** Permafrost impacts resulting from vegetation removal)	3-4
3.2.2	Surface Water (**Issue 3:** Flooding and hydrology, particularly with respect to winter ice overflow (aufeis) at Jarvis Creek)	3-9
3.2.3	Fire Management (**Issue 4:** Risk of wildfires)	3-15

3.2.4	Noise (**Issue 5:** Noise impacts)	3-29
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3.2.6	Wildlife and Fisheries (**Issue 7:** Seasonal moose movement and springtime migratory bird and waterfowl migration	3-41
3.2.7	Cultural Resources (**Issue 8:** Impacts to cultural/historical/grave sites)	3-54

Table 3.1.1.b Secondary Issues of Concern

Section	Resource Category	Page Number
3.3.1	Air Quality	3-62
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3.3.3	Wetlands	3-66
3.3.4	Vegetation	3-70
3.3.5	Threatened or Endangered Species and Species of Concern	3-77
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3.3.7	Subsistence	3-90
3.3.8	Public Access and Recreation	3-97
3.3.9	Environmental Justice	3-105
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This discussion concentrates on the Eddy Drop Zone, Donnelly Drop Zone, and North Texas Range sites, as they are the remaining viable locations after initial screening. For detailed discussions and subsequent evaluations, larger study areas, or regions of influence, were developed. These study areas included the range "footprints" of the Battle Area Complex (BAX) and the Combined Arms Collective Training Facility (CACTF) while allowing the "notional" option for varying placement and orientation to minimize or avoid environmental impacts, or to situate the facilities to better support military training. The study areas also include areas to allow units to "stage" for use of the BAX and CACTF, and to allow for associative training by those elements of units not actually engaged in use of the BAX or CACTF. These larger study areas are

necessary for the detailed evaluation of environmental effects, as they extend beyond the immediate range sites. Actual BAX and CACTF range footprints, smaller than each study area, are shown in Appendix, Figures 2.f, 2.g, and 2.h.

Previous EISs, studies, and management plans, that address ongoing actions, issues, or baseline data, are used as background information or "incorporated by reference" into this EIS, as appropriate. The major documentation relied upon includes:

- Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 1-2, 2004.
- Final Legislative Environmental Impact Statement for Alaska Army Lands Withdrawal Renewal, Vol. 1-2, 1999.
- Integrated Natural Resources Management Plan 2002-2006: Fort Greely and Donnelly Training Area, 2002.
- Integrated Cultural Resources Management Plan 2001-2005: Fort Greely and Fort Wainwright, 2002.
- Working Draft Ecosystem Management Plan, Donnelly Training Area, 2003.
- Working Draft Forest Management Plan, Donnelly Training Area, 2002.

3.1.2 Description of USARAK Lands

A majority of U.S. Army Alaska (USARAK) lands, which include DTA, are on long-term withdrawal from the public domain, originally assigned to the Bureau of Land Management (BLM). Ultimate responsibility for these withdrawn lands remains with the BLM, which retains interest in the stewardship of the parcels, even though the land is under long-term Department of Defense (DoD) management. Withdrawal documents and executive orders indicate that withdrawn lands are not available for disposal actions, such as state or Native selection, sales under the Federal Land Planning and Management Act or the Recreation and Public Purposes Act, or other exchanges.

3.1.2.1 Donnelly Training Area East

DTA is located approximately 100 miles southeast of Fairbanks and lies within the Tanana River Valley (Appendix, Figure 3.a), encompassing approximately 631,000 acres.

The Delta River and its floodplain form the west side of DTA East, and Granite Creek forms the eastern border. The northern boundary roughly parallels the Alaska Highway, and the southern boundary lies at the base of the Alaska Range's foothills. The Main Post is managed with DTA East, and it lies south of Delta Junction.

3.1.2.2 Climate Regime at Donnelly Training Area East

DTA has the northern continental climate of interior Alaska, which is characterized by short, moderate summers; long, cold winters; and low precipitation and humidity. Average monthly temperatures range from -3 degrees Fahrenheit (ºF) in January to 60 ºF in July; with an average annual temperature of 28 ºF. Prevailing winds are from the east-southeast between September and March and from the west, southwest, or south between April and August. The average annual wind speed is approximately nine miles per hour. The greatest wind speeds occur during winter. Thunderstorms are infrequent and occur only during summer. Average annual precipitation is less than 12 inches, which falls over 93 days, mostly during summer and early fall. Average monthly precipitation ranges from a low of 0.25 inches in April to a high of 2.6 inches in July. Average annual snowfall is approximately 43 inches, with a record 99.7 inches in 1945. Heavy fog is

relatively common during December and January (USARAK 2001). Ice fog can form at temperatures below -20 °F. Ordinarily, ice fog will only occur in areas near human settlements, where there is a water vapor source (USARAK 1979). Climate statistics for DTA are listed in Table 3.1.2.a.

Table 3.1.2.a Mean Average Climate Statistics for Donnelly Training Area

Location	July Monthly Average Maximum Temp. (°F)	January Monthly Average Minimum Temp. (°F)	Annual Precip. (in.)	Annual Snowfall (in.)	Maximum Snow Depth (in.)	Wind Speed (mph)
DTA (Big Delta Weather Station)	70	-11	Less than 12	43	10	9

Source: Western Regional Climate Center 2002

3.2 PRIMARY ISSUES OF CONCERN

3.2.1 SOIL RESOURCES

Issue 2: Permafrost impacts resulting from vegetation removal. The impact of construction and operation of the BAX and CACTF to permafrost was identified as a primary issue of concern during scoping. Additional information can be found in Section 1.9, *Issues Identified During the Scoping Process*.

3.2.1.1 Soil Characteristics

The Natural Resources Conservation Service (NRCS), formerly the Soil Conservation Service, initiated a soil survey of DTA in 1999 and completion is expected in 2004. Soils in DTA are primarily derived from glacial activities, modified by streams and discontinuous permafrost, and, in many places, overlain by loess. Few soils in DTA have been mapped in detail, with the exception of areas near the Main Post. The NRCS has identified 12 soil associations in the area (Rieger et al. 1979). Soils in DTA East were described as a shallow silt-loam over gravelly sand.

The soils in the river floodplains consist of alternate layers of sand, silt-loam, and gravelly sand. Soils of muskegs are highly organic and wet, with a high water table. They may also be underlain by permafrost. The upland foothills have moist, loamy soils- when compared to mountain soils- that are rocky, steep, and un-vegetated. Lowland soils were found to have moderate erosion potential while foothill soils have moderate to high erosion potential (USARAK 1979).

The NRCS maps indicate the presence of highly variable soils, primarily due to the diverse geomorphic landscape and sediments comprising it. Glacial moraines were typically classified as gravelly sand and silt with outwash terraces, classified as well-drained, well-graded, gravelly sands. Loess forms siltier soils, and lowland and riparian areas were classified as organic silts of varying wetness.

Table 3.2.1.a (Rieger et al. 1979) lists soil associations potentially affected by the alternative courses of action (the three detailed study areas), and briefly describes these soil associations.

Table 3.2.1.a Description of the Soil Associations in Donnelly Training Area Study Areas

Soil Map Unit	Soil Type	Study Area and Location	Description
pcpc6	Pergelic Cryaquepts in association with Pergelic Cryochrepts	**Donnelly Drop Zone and North Texas Range:** Foothills and moraines of the Alaska Range in the southern part of Fort Greely and DTA.	40% - poorly-drained gravelly and stony loams. 35% - well-drained gravelly and stony loams. Remainder – poorly-drained silt loams.
tchpc8	Typic Cryochrepts in association with Histic Pergelic Cryaquepts	**North Texas Range:** Hilly portions along the Delta River in the eastern portion of Fort Greely and DTA.	45% - well-drained silt loams. 30% - poorly-drained shallow silt loams. Remainder - a mixture of very gravelly loams and silt loams.
tc9	Typic Cryochrepts	**Eddy Drop Zone, Donnelly Drop Zone, and North Texas Range:** Terraces, outwash plains, and low moraines along Jarvis Creek.	70% - shallow silt loams. 30% - shallow loams or gravels and poorly-drained silty to gravelly soils.
tc10	Typic Cryochrepts	**Near Eddy Drop Zone:** Hilly and steep moraines northeast of the Air Drop Zone.	65% - shallow silt loams. Remainder - gravelly loams.
tchpc12	Typic Cryochrepts in association with Histic Pergelic Cryaquepts	**Eddy Drop Zone and Donnelly Drop Zone:** Moraines and footslopes to the east of Jarvis Creek.	65% - gravelly silt loams over very gravelly loams. Remainder - gravelly, stony silt loam or sand loam.

3.2.1.1.1 Soil Characteristics at Eddy Drop Zone

Soils in the Eddy Drop Zone study area are Typic Cryochrepts (Soil Map Unit tc9) (northwestern portion), Typic Cryochrepts in association with Histic Pergelic Cryaquepts (Soil Map Unit tchpc12) (eastern and southern portions), and Typic Cryochrepts (Soil Map Unit tc10) (far southeastern corner) (Rieger et al. 1979).

The Eddy Drop Zone study area lies within an extensive, fairly flat glacial outwash terrace characterized by gravelly soils with a thin eolian and alluvial silt layer. A few low bog areas contain thicker silt and peat deposits. Permafrost is confined to these few low bog areas. Several relic stream channels of Jarvis Creek cross the study area.

3.2.1.1.2 Soil Characteristics at Donnelly Drop Zone

Soils in the Donnelly Drop Zone study area are Typic Cryochrepts (Soil Map Unit tc9) (eastern portion), Typic Cryochrepts in association with Histic Pergelic Cryaquepts (Soil Map Unit tchpc12) (primarily west of Jarvis Creek), and Pergelic Cryaquepts in association with Pergelic Cryochrepts (Soil Map Unit pcpc6) (southeastern boundary) (Rieger et al. 1979).

The western third of the Donnelly Drop Zone study area lies within a fairly flat glacial outwash terrace characterized by gravelly soils. The central third of the study area lies within the floodplains of Ober and Jarvis Creeks. Vegetated eolian (wind-formed) and alluvial (water-formed) silts covering gravelly soils at depth characterize the Ober Creek floodplain. It has extensive permafrost. The eastern third of the study area is within the Delta glacial moraine with rolling hills and hummocky features. Low areas in moraine contain thick silt and peat deposits and extensive permafrost.

3.2.1.1.3 Soil Characteristics at North Texas Range

Soils in the North Texas Range study area are Typic Cryochrepts in association with Histic Pergelic Cryaquepts (Soil Map Unit tchpc8) (most of study area), Pergelic Cryaquepts in association with Pergelic Cryochrepts (Soil Map Unit pcpc6) (southeastern portion), and Typic Cryochrepts (Soil Map Unit tc9) (eastern border) (Rieger et al. 1979).

The western two thirds of the North Texas Range study area lies within the Donnelly glaciofluvial outwash terrace. This terrace is 150 feet (ft) or more above the adjacent floodplain of the Delta River and consists of thick deposits of coarse gravel and sand with some silt. Within the outwash terrace are extensive areas that contain thicker silt and peat deposits with permafrost. The southeastern portion of the site lies within the Donnelly moraine. This steep, hummocky area consists of sandy till with rock fragments. Numerous kettle depressions contain lakes and some bogs with silt and peat. Depressions are underlain by permafrost.

3.2.1.2 Permafrost

Permafrost is a major factor influencing the distribution of vegetation and human activities in Alaska. Permafrost is defined as soil, silt, and rock that remain frozen year-round. Though a thin layer may thaw during summer months, the majority of permafrost remains frozen until the local climate changes due to natural climatic fluctuations, or it melts due to disturbance of the insulating peat and vegetation above it.

Permafrost typically exists in multiple layers of varying thickness, ranging from less than one foot to more than 150 ft. In most undisturbed areas, the depth to permafrost varies from two to three ft (Williams 1970). The deepest point at which ground temperatures remain below 32°F throughout the year defines the base of the permafrost layer. The upper surface of the perennially frozen ground is called the permafrost table, and the active layer is the zone above the permafrost table that thaws in summer and freezes again in winter (Williams 1970).

Permafrost creates important effects on such soil processes as cryoturbation, runoff, subsidence and drainage. Cryoturbation is the mixing of soil due to freezing and thawing, which results in contorted and broken soil horizons. More runoff occurs on sloping soils with permafrost, as the permafrost prevents the infiltration of water into the ground, promoting rapid runoff. Subsidence of the ground surface can occur if permafrost melts (Swanson and Mungoven 2001). The

impermeable surface of the permafrost table can create a barrier to water flow, and often causes permafrost areas to remain very wet or even saturated during the summer months.

Any activity that removes the insulating vegetation mat, or destroys the active layer above the permafrost table, allows the ice-rich soil to melt and irregular surface subsidence can occur. The tendency for settling and frost action is directly proportional to the silt content of the soil. "Thermokarst" is the term given to describe this process and the range of features formed from irregular subsidence. These features may include hummocks and mounds, water-filled depressions, flooded forests, mudflows on sloping ground, or other resultant landforms. The thawing process is difficult to control, and, once formed, thermokarst features are likely to persist (Berger and Iams 1996). The amount of subsidence and collapse of the ground surface is dependent on the ice content of the ground.

Once started, the thawing process is difficult to control. Maneuver or construction activities could result in this type of damage if conducted in areas of high ice content. Selected sites should have the lowest possible ice content, and steps should be taken to ensure adequate ground insulation (Nakata Planning Group 1987).

Each of the three alternative sites lie within the zone of discontinuous permafrost (Ferrains, 1965), occurring in some areas beneath the ground surface throughout a geographic zone where other areas are free of permafrost. Permafrost is highly patchy and irregular on DTA, particularly in morainal areas where abrupt changes in slope and aspect occur (Jorgenson 2001). The highly variable sediment types, complicated topography, and micro-climatic variability make prediction of permafrost difficult. Isolated patches of permafrost are found in areas under DTA's sandy gravel, from two to 40 ft below ground level. Thickness of permafrost varies widely from 10 to 118 ft. While a relatively large portion of the landscape has discontinuous permafrost, existing and abandoned river channels, lakes, wetlands, and other low-lying areas are likely permafrost-free (Williams 1970).

Only a small proportion of DTA is presently affected by permafrost degradation, indicated by the presence of thaw ponds. Permafrost degradation at DTA appears to be less than other areas in interior Alaska, due to the cooler climate and higher elevations, and the prevalence of "thaw-stable", gravelly soils. However, areas dominated by loess or other silty sediments may be more vulnerable to permafrost degradation. Continued climatic warming or ground disturbance may increase the amount of thermokarst at DTA.

3.2.1.2.1 Permafrost at Eddy Drop Zone

Very limited areas of permafrost were encountered at the Eddy Drop Zone study area during detailed geotechnical exploration programs conducted during the summer and late fall of 2002 (R&M Consultants 2002, 2004 and USACE 2004). Two isolated areas of permafrost were encountered at the proposed BAX site. Borings located in a small depression in the glacial moraine, along the east side of the site, encountered permafrost. At the proposed building site, permafrost was also encountered in fine-grained material near the surface. In general, the proposed BAX site was found to be relatively free of permafrost (R&M Consultants 2002, 2004 and USACE 2004). At the proposed CACTF site, isolated areas of perennially frozen fine-grained soils were encountered.

Using the information gathered during the geotechnical investigation and aerial photo interpretation, areas with a higher potential for permafrost were delineated on site maps.

Additional drilling at these locations is planned to confirm the initial interpretation prior to construction if this site is selected as the preferred alternative.

3.2.1.2.2 Permafrost at Donnelly Drop Zone

The Donnelly Drop Zone study area lies to the east of Donnelly Dome and the Richardson Highway, on both sides of Jarvis Creek. The Donnelly Drop Zone study area lies in areas that exhibit isolated masses of permafrost and discontinuous permafrost (Ferrains 1965). The area lying on the west side of Jarvis Creek is mapped as glaciofluvial deposits (Péwé and Holmes 1964). Data presented by Péwé and Holmes indicates isolated pockets of permafrost. Interpretation of vegetation patterns indicates that some of these pockets may be extensive (up to 0.5 mile in diameter). On the eastern side of Jarvis Creek, the Donnelly Drop Zone study area lies on a glacial moraine of the Delta Glaciation. This area is underlain by discontinuous permafrost (Ferrians 1965). Holmes and Benninghoff (1957) noted that permafrost was observed in the areas of Muskeg Hill and Butch Lake on the northern portion of Donnelly Drop Zone study area. They also mention permafrost under hummock bogs (bogs in the depressions on glacial till). Geologic mapping shows extensive areas of bogs on the Delta Moraine (Péwé and Holmes 1964) along the east side of the Donnelly Drop Zone study area. Extensive permafrost can be expected in these areas. In August 1955, Holmes and Benninghoff reported that an earth flow was observed on a tank trail on Muskeg Hill. They further reported that the disturbed surface layer moved downslope in late July or early August, sliding on frozen Delta till.

A detailed geotechnical exploration program was not conducted at Donnelly Drop Zone study area. If the Donnelly Drop Zone study area alternative is selected as the location for construction and operation of a BAX and CACTF, drilling will be conducted, prior to the action, to identify areas of higher permafrost potential and confirm the initial interpretation at specific construction sites.

3.2.1.2.3 Permafrost at North Texas Range

The North Texas Range study area is located to the northwest of Donnelly Dome and lies on glacial moraines and glacial outwash terraces of the Donnelly Glaciation (Péwé and Holmes 1964). Péwé and Holmes note that permafrost occurs within 10 to 25 ft of the surface in the area. Holmes and Benninghoff (1957) indicate that permafrost was encountered under hummock bogs. Bogs are located on the Donnelly Moraine along the east side of the North Texas Range study area (Péwé and Holmes 1964). The Trans-Alaska Pipeline, located approximately two miles east of the North Texas Range study area, is elevated in response to the “non-thaw-stable” permafrost in the area. Extensive areas of permafrost can be expected within the North Texas Range study area.

A detailed geotechnical exploration program was not conducted at North Texas Range. If this site is selected as the location for BAX and CACTF construction and operation, drilling will be conducted, prior to the action, to identify areas of higher permafrost potential and confirm the initial interpretation at specific construction sites.

3.2.2 Surface Water

Issue 3: Flooding and hydrology, particularly with respect to winter ice overflow (aufeis) at Jarvis Creek. The impact of construction and operation of the BAX and CACTF on local hydrology was identified as a primary issue of concern during scoping. Additional information can be found in Section 1.9, *Issues Identified During the Scoping Process*.

3.2.2.1 Waterways

Surface water within DTA East drains into the Delta River, including Granite, Ober, and Jarvis creeks. The Delta River drains directly into the Tanana River.

DTA's surface waters are diverse, including numerous rivers, streams, ponds, and lakes. Appendix, Figure 3.b illustrates the general hydrology of the three study areas. DTA lies entirely within the Tanana River drainage basin. A majority of the larger streams flowing through DTA, such as the Delta River and Jarvis Creek, are glacial. The volume of surface water flow fluctuates dramatically by season. From October to May, flow is limited to groundwater seepage from aquifers into streams, and many small streams freeze solid (zero discharge). Any additional streamflow is converted to winter ice overflow, or "aufeis," an ice sheet that forms on a floodplain in winter (when normal channels freeze solid or are otherwise dammed so that water spreads out over the surface and also freezes). Aufeis can accumulate to several meters in thickness and cover large areas of the active floodplain in streams such as the Delta River and Jarvis Creek, over a winter. Snowmelt typically begins in May and reaches its peak in June, coinciding with the peak melting of glaciers. Flows are greatest during June and July. After July, most of the snow has melted, and rainfall sustains a steady flow during August and September.

Glaciers, lying along or south of DTA's southern boundary, feed most rivers, streams, and creeks. Glacial meltwaters feed the Delta River, Delta Creek, and the Little Delta River from the Alaska Range. Principal glaciers include Canwell, Castner, and Black Rapids, which drain into the Delta River. Jarvis Creek is fed by meltwater from glaciers on Mt. Silvertip (USARAK 1979).

Broad coalescing alluvial fans form an outwash plain from the Alaska Range and the glacial moraines in the south of DTA to the Tanana River to the north. They are composed of moderately well-sorted silt, sand, and gravel. Isolated masses of permafrost exist in places from three to 40 ft below the ground surface, with the base of permafrost ranging from 10 to 118 ft in depth. Most permafrost lies above the present regional groundwater table. The Delta River and Jarvis Creek are glacier fed and have broad braided channels flowing over the permeable alluvial fan deposits. Large quantities of streamflow infiltrate through the sediments into the groundwater table, resulting in decreasing streamflow in a downstream direction. Jarvis Creek ceases to flow at the Richardson Highway during the winter, although flow may persist throughout the winter farther upstream, resulting in thick buildup of aufeis in the stream channel.

The predicted 100-year flood discharge for the Delta River is 42,000 cubic feet per second (cfs) and for Jarvis Creek 15,400 cfs (Table 3.2.2.a).

Table 3.2.2.a Expected Flood Discharge for the Delta River and Jarvis Creek

Stream	Drainage Area (square miles)	Expected flood discharge (cfs)			
		10 years	50 years	100 years	500 years
Delta River	1,638	17,100	33,000	42,000	67,000
Jarvis Creek	248	6,400	12,000	15,400	24,000

Source: Federal Emergency Management Agency 1982

3.2.2.1.1 Waterways at Eddy Drop Zone

Appendix, Figure 3.c illustrates the surface waters potentially affected by the proposed location of the BAX and CACTF within the Eddy Drop Zone study area. Jarvis Creek, the main waterway within the Eddy Drop Zone study area, originates at the terminus of Jarvis Glacier on the north side of the Alaska Range, and flows northward for 40 miles through a narrow valley before passing through DTA East. The creek drains an area of 248 square miles and receives glacial meltwater from Riley and Little Gold creeks. McCumber Creek and Morningstar Creek are non-glacial streams that enter Jarvis Creek from Granite Mountain. As it passes through DTA, Jarvis Creek flows across a large alluvial fan before it joins the Delta River.

The proposed locations of the BAX and CACTF within the Eddy Drop Zone study area are on a large glacial outwash fan, formed where Jarvis Creek flows out of the Delta Glaciation end moraine features. The apex of this outwash fan is about seven miles south of the main Fort Greely cantonment area. The outwash fan is generally a broad, gently sloping landform, steeper at the proposed BAX site than at the proposed CACTF site. The active channel of Jarvis Creek flows down the center of the outwash fan near the BAX site and then turns west just before reaching the CACTF site, where it flows down the western edge of the fan to the existing Richardson Highway bridge (Appendix, Figure 3.c).

The proposed location of the BAX and CACTF are within the mapped 100-year floodplain of Jarvis Creek, but outside of the active gravel-braided channel. The floodplain is subject to overbank flooding and aufeis overflows. The extent of such flooding, up to the 100-year recurrence interval, was estimated and mapped in 1978 using high altitude aerial photography, satellite imagery, and observations (Soil Conservation Service (SCS) 1978), and updated in 1982 as part of a Flood Insurance Study and a Flood Insurance Rate Map prepared by the Federal Emergency Management Agency (FEMA) (FEMA 1982). In 1987, a more extensive analysis of flooding and erosion potential was undertaken, and some suggested flood protection measures were proposed (USDA 1987). The 1978, 1982, and 1987 floodplain analyses only covered a small portion of Fort Greely and just the northern portion of the Jarvis Creek watershed.

An abandoned channel of Jarvis Creek, located along the western side of the proposed CACTF site, crosses the Buffalo Drop Zone, just north of Eddy Drop Zone, and runs through the community of Delta Junction. The Delta Junction School (on Tanana Street) and the community airstrip are located on this abandoned channel, lying within the 100-year floodplain (FEMA 1982). USARAK built an earthen barrier where this channel leaves Jarvis Creek in 1967 (in the vicinity of 33-Mile Loop Road) and this channel has not flooded since then (USDA 1987).

Aufeis formation or “ice damming” has historically caused the water in Jarvis Creek to overflow the natural streambank during the spring, following alternate high water channels or drainage ways east of Jarvis Creek through the community of Delta Junction. Flooding of outlying areas commonly occurs annually, and some flooding occurs within Delta Junction (Darby and Associates 1980). Measurements indicate that Jarvis Creek, during the summer period, loses

water to its bed (groundwater) as it flows downstream over a widening floodplain (Holmes and Benninghoff 1957). This indicates that potential flooding is more probable in late spring, when the creek bed is frozen and aufeis remains in portions of the creek.

Several highwater channels or drainage ways cross the proposed BAX site, and water was flowing across certain areas of the site during site visits in the spring of 2002 and 2004. In the spring of 2004, Delta Junction experienced an infrequent event that combined (1) the usual effects of aufeis and melt-induced surface runoff and (2) high rainfall. This combination of events led to considerable flooding of the proposed BAX site, and downstream flooding in Delta Junction. Remnant aufeis remained in Jarvis Creek about two miles south of the proposed BAX site; and, starting in late April, diverted meltwater out of the blocked channel, over the bank, and into an old highwater drainage way flowing to the northeast along the east side of Eddy Drop Zone (Appendix, Figure 3.c). On the 8th and 9th of May 2004, heavy rains (over one inch) and warm temperatures resulted in a significant rain-on-snow event in the central Alaska Range; and the remnant aufeis forced water out of Jarvis Creek and into the highwater drainage way. Water flowed northeast through the proposed BAX site and along and across 33-Mile Loop Road. The flow continued northeast, crossing under the Alaska Highway about six miles southeast of Delta Junction. Flow then continued northwest, crossing Nistler and Jack Warren Roads (NOAA 2004). Based on estimates of flow width, velocity, and depth, a flow of 500 cfs was estimated at a low water crossing of 33-Mile Loop Road east of Eddy Drop Zone. Flows at the Alaska Highway culvert crossing were estimated at least 1,000 cfs (Collins 2004).

One of the overflow channels is a ditch along the west side of the existing Eddy Drop Zone, cut down through the surficial silt to the gravel below, and draining water away from the Eddy Drop Zone. During the spring 2002 site visit, the ditch was flowing full to a depth of five and seven ft deep. This same site visit verified a naturally occurring high water flow area to the east of the Eddy Drop Zone. This is further verified by aerial photos as a dendritic shaped band of deciduous trees and open spruce forest, as opposed to the dense spruce covering the remainder of the outwash fan. Water drains as “sheet flow” through this area and not in defined, active channels. These areas are covered by moss and brush, indicating only low velocity flows in the recent past. The high water channels (crossing the proposed BAX site) flow into a large flat area, with scattered bogs to the east of the proposed CACTF site (between the site and the glacial moraines). Water leaving the BAX site is likely stored in this area until it evaporates or drains down through the underlying gravels. This “boggy area” continues north, across the Alaska Highway and east of Delta Junction, as shown on U.S. Geological Survey topographic maps (U.S. Geological Survey 1988a,b); the Delta Flood Hazard Study (SCS 1978); and appears within the 100-year floodplain.

There is no evidence of high water channels or flow across the CACTF site. The previously discussed two main overflow channels lie on either side of the CACTF site. A ditch along the west edge of the site has been excavated (with berms along the sides) to accommodate likely flows during periods of high water.

3.2.2.1.2 Waterways at Donnelly Drop Zone

Appendix, Figure 3.d illustrates the surface waters potentially affected by proposed location of the BAX and CACTF within the Donnelly Drop Zone study area. Jarvis Creek and its tributary, Ober Creek, bisect the study area (See description of Jarvis Creek in Section 3.2.2.1.1). The proposed range facilities would be located along Jarvis Creek within its floodplain. The Donnelly Drop Zone study area is located upstream from the Eddy Drop Zone study area. Other un-named, seasonal watercourses also traverse the area. Ober Creek and these smaller waterways are non-glacial.

Portions of the proposed location of the BAX and CACTF are within the floodplains of Jarvis Creek and Ober Creek. The floodplain analysis of a portion of Jarvis Creek, conducted by the SCS (1978), does not extend as far south as the Donnelly Drop Zone study area. A map of the floodplains of Ober and Jarvis Creek (Appendix, Figure 3.d) was developed using aerial photography and existing maps of geology and landforms (Pèwè and Holmes 1964). Although no ground measurements were made to determine the exact extent of the 100-year floodplain as part of this mapping effort, the steep topography and the restricted nature of the floodplains ensure that the mapped floodplains will closely correspond with a 100-year floodplain.

Access during breakup is quite limited, and no recent direct observations of the area have been made to assess potential flooding issues. Aerial photography shows the potential for flooding to the east, continuing north through Butch Drop Zone. Evidence of old, alternate streambeds for Ober Creek, and others across the study area, is also visible.

3.2.2.1.3 Waterways at North Texas Range

Surface water from the North Texas Range study area drains into the Delta River, which passes through the northwestern corner of the study area (Appendix, Figure 3.e). The Delta River flows northward 80 miles from its headwaters to its confluence with the Tanana River, and runs through DTA for approximately 30 miles. It drains an area of approximately 1,650 square miles. The river originates as a non-glacial waterway at the Tangle Lakes, approximately 50 miles south of the southern boundary of DTA. As the river flows through the Alaska Range, it receives significant meltwater from Canwell, Castner, Gulkana, College, Eel, Jarvis, McGinnis, Augustana, Eureka, and Black Rapids glaciers, and several smaller glaciers.

Downstream from Black Rapids Creek, the Delta River broadens and the gradient is reduced (Ferrick et al. 2001). Upon entering DTA, the river flows across a north-sloping alluvial fan, where the channel becomes braided and complex. With the exception of Jarvis Creek, the Delta River has no major tributaries once it leaves the Alaska Range.

Low flow for the Delta River usually occurs between October and April. Flow increases dramatically during May, with high flows occurring between June and August. The mean annual flow of the Delta River is estimated to be 13,000 cfs with the 100-year flood frequency estimated to be 42,000 cfs (Dingman et al. 1971, USDA 1987).

The footprints of the BAX and CACTF are not located within the floodplain of the Delta River, but the BAX surface danger zone (SDZ) would include the Delta River (Appendix, Figure 3.e). There are small streams flowing through the study area that drain into the Delta River.

Within the North Texas Range study area, the Delta River is confined to a wide braided floodplain incised 150 ft or more into the Donnelly glaciofluvial outwash deposits and the Donnelly glacial moraine, forming high bluffs on either side of the river. The proposed footprint of the BAX and CACTF within the North Texas Range study area is located within the Donnelly glaciofluvial outwash terrace and the Donnelly moraine east of the Delta River, and on a bluff high above the active floodplain.

The SDZ is within the Delta River floodplain. A USDA floodplain analysis of a portion of Jarvis Creek and the Delta River (USDA 1978) does not extend as far south as the North Texas Range study area. A map of the Delta River floodplain in this area (Appendix, Figure 3.e) was developed using aerial photography and existing geology and landform maps (Pèwè and Holmes 1964). Although no ground measurements were made to determine the exact extent of the 100-

year floodplain as part of this mapping effort, the steep topography and the restricted nature of the floodplain in this area ensure that the mapped floodplain will closely correspond with a 100-year floodplain.

3.2.2.2 Lakes and Ponds

Lakes and ponds are an important component of the surface water resources at DTA. These resources provide various benefits such as water storage, flood control, water supply sources, and recreation. They also provide important habitat for numerous fish and wildlife species.

3.2.2.2.1 Lakes and Ponds at Eddy Drop Zone

A total of 23 shallow lakes and ponds lie within the eastern and southern edges of the Eddy Drop Zone study area, and are associated with the moraine topography (Appendix, Figure 3.b). None of these are managed for recreational fishing due to their susceptibility to freezing. In addition, 10 dry lakebeds are present within the Eddy Drop Zone study area. Overall, lake levels appear to be dropping (drying up) within this area (Clark 2004).

3.2.2.2.2 Lakes and Ponds at Donnelly Drop Zone

Butch Lake is the only large lake or pond on the Donnelly Drop Zone study area (Appendix, Figure 3.b). It is a large, shallow lake in the northeast corner of the study area, accessible by 33-Mile Loop Road. It is not suitable for stocking by the Alaska Department of Fish and Game (ADF&G). Two small lakes (less than two acres) lie on the far eastern edge of the study area.

3.2.2.2.3 Lakes and Ponds at North Texas Range

There are numerous lakes and ponds within the glacial moraine in the eastern portion of North Texas Range study area (Appendix, Figure 3.b). The Meadows Road/Windy Ridge Road/Old Richardson Highway loop has 14 lakes that are stocked by the ADF&G. Big Lake is too shallow for stocking, but is a popular non-fishing recreation destination. Proposed footprints for the ranges would include J, Nickel, Chet and Ghost lakes, which are stocked, in addition to 35-40 other lakes and ponds.

3.2.2.3 Surface Water Quality

The state of Alaska has not designated water-use categories for the streams on DTA, so these fresh waters are considered to be in their original and natural condition, and suitable for all uses. The pH levels in the Delta River and Jarvis Creek are slightly alkaline, but they are within limits established by the State. Dissolved oxygen levels generally vary with water flow; are highest in June, July, and August; and may approach zero during periods of prolonged ice cover (Bonito 1980, USARAK 1979).

While lakes are abundant on DTA, their water quality has not been scientifically determined. Water samples from Bolio Lake indicated a pH of 8.8 to 9.2, an alkalinity beyond acceptable limits defined by the State. Nitrogen in Bolio Lake is in organic forms (0.98 milligrams per liter (mg/l)), with low concentrations of nitrates and nitrate nitrogen (0.02 mg/l). Samples collected from Bolio Lake in August 1975 had dissolved oxygen concentrations of 9.8 mg/l near the surface, and 10.0 mg/l at a depth of 15 ft.

3.2.2.3.1 Surface Water Quality at Eddy Drop Zone, Donnelly Drop Zone, and North Texas Range

In a site-specific study of water quality in streams flowing through DTA (United States Army Environmental Hygiene Agency 1990), water and sediment samples were collected upstream and downstream. Upstream values indicate the background or natural water quality of DTA. The *Transformation of U.S. Army Alaska Final Environmental Impact Statement Vol. 2,* Appendix E lists water quality and characteristics for the Delta and Tanana rivers, respectively.

Surface water quality values on DTA meet the primary standards set by the Alaska Drinking Water Standards (18 AAC 80). However, aluminum, iron, and manganese concentrations were higher than the state's secondary standards. DTA water contains calcium carbonate, and is slightly basic. The pH measurements from DTA ranged from 7.9 to 8.4, within the limits established by the state's standards (6.5-8.5) (USARAK 2004a).

Iron may occasionally exceed the secondary drinking water standard of 0.3 mg/l for potable water sources. High iron concentrations are typical in streams that drain wetland areas high in organic matter (Anderson 1970). Dissolved oxygen values measured at DTA were above the state's minimum level of 4.0 mg/l. Dissolved oxygen values ranged from 9.7 mg/l at the Delta River to 12.1 mg/l at Jarvis Creek (USARAK 2004a).

The U.S. Army Corps of Engineers (USACE) recently completed a study of Jarvis Creek (Bristol Environmental and Engineering Service 2003). Arsenic levels ranged from 2.1 to 35.8 micrograms per liter, within State of Alaska and Environmental Protection Agency (EPA) surface water quality standards. The pH levels ranged consistently between the state standards of 6.5 to 8.5. Dissolved oxygen ranged from 1.15 to 19.90 mg/l, while the state standard is between 4 and 17 mg/l. Temperature ranged from 5 to 16° C, with higher temperatures dominating the shallow, braided parts of the creek. Alaska state standards are less than 15° C for drinking water, or 20° C for general supply. All other measured parameters were within or below the state's criteria. Streams from the Alaska Range tend to have a higher sulfate and magnesium content than other streams in the Tanana Basin, although the levels are below the state's standards.

The average annual suspended sediment yield for the Delta River is 1,200 tons per square mile (Dingman et al. 1971), and the sediment load ranges from 100 to 1,000 mg/l during the open-water season. In-stream sediment samples from the Delta River and other similar streams yielded the following particle size distribution:

- clay size – 10-25% of suspended material
- silt size – 40-50% of suspended material
- sand size – remainder (25-50%) of suspended material

Most of the clay and silt-sized material at glacial endpoints is rock silt, which is found in layers at the bottom part of most glaciers. Rock silt forms in the glacial bed as rock and is ground into fine particles by glacial movement. These particles are transported to receiving waters by melting and freezing cycles at the bed-glacier interface.

High stream flows tend to have lower concentrations of dissolved solids. Typical of the Alaska Range, the streams that contain the highest dissolved solids (during low flow periods) are those that drain areas of mineralized bedrock (Dingman et al. 1971). Sediment load concentrations also change rapidly with changes in stream discharge. Thus, more than 99% of the annual sediment

load is transported during the summer, and it is evenly distributed during this time period (Anderson 1970).

Delta River bedload carries mostly particles larger than sand size, which move by rolling, bouncing, and drifting just above the streambed. Thus, the bedload contains channel and floodplain material with a mixture of gravel particles (averaging about 1.6 inches in diameter), sand, and silt. Total bedload yield for the Delta River cannot be estimated (Dingman et al. 1971).

3.2.3 FIRE MANAGEMENT

Issue 4: Risk of wildfires. The impact of construction and operation of the BAX and CACTF to wildfire risk was identified as a primary issue of concern during scoping. Additional information can be found in Section 1.9, *Issues Identified During the Scoping Process*.

Northern boreal ecosystems evolved with natural fire events (Shugart et al. 1992), and future disturbance by wildland fires is assured, regardless of management alternatives chosen. Species-specific fire effects on northern vegetation, including Alaska, have been compiled and summarized into an electronic Northern Rockies Interagency Fire and Aviation Management Fire Effects Information System. Information on Alaskan fire effects, by vegetation types, has been summarized in *Wildland Fire in Ecosystems: Effects of Fire on Flora* (USFS 2000), and reviewed in *Effects of Fire in Alaska and Adjacent Canada: A Literature Review* (Viereck and Schandelmeier 1980). This information summarizes the effect on individual species, and is incorporated by reference into this analysis.

The vegetation (fuels) on the floor of Alaskan forests is composed almost entirely of small, fast drying fuels. When the relative humidity falls, the moisture content of these fuels follows very quickly. Surface fuels in Alaska become almost involatile above 15% moisture content. They burn readily at 8 to 10%; and, at 5 to 7%, these fuels burn with fierce intensity, and can carry fire into tree crowns (Norum 1980).

Boreal spruce is found throughout southcentral and interior Alaska. Depending on the individual site, black spruce morphology can vary greatly. However, the trees will almost always have a continuous ladder of fuels reaching from the surface of the forest floor into the crowns. Regardless of moisture content, black spruce needles are always prone to vigorous burning, primarily due to the heavy content of volatile waxes and resins. Black spruce forests have an almost mattress-like layer of moss, lichens, and dead material on the forest floor. Dead tree branches extend to the ground. The ground fuels are either dead or contain enough flammable substance to carry a fire when they dry out. While a fire that stays on the ground is relatively easy to suppress; one that “kicks up”, and involves the trees, has an intensity comparable to California brush fires. These trees are always “moisture starved”, with needle fuel moisture greater than 10% coming out of winter. As this rises only slightly during the growing season, canopies readily burn when they get enough heat underneath.

In general, when the Relative Humidity (RH) drops into the 40% range, trees become susceptible to fire and, if wind speed is over 10 miles per hour (mph), such a fire will become a slow moving crown fire, with a surface fire ahead of the crown fire. If RH falls into the 30% range, potential fire intensity increases. While well-established fire lines can hold a fire if wind is below 5 mph; windspeeds of 10 mph (or greater) will create a full-blown, running crown fire that “spots” ahead, and is too hot for fire crews to handle. RH of 30% (or lower) is always dangerous; as crown fires are nearly certain, and the fire is too intense to work near. Any wind will cause spotting across all

but the widest fuel breaks. Winds above 10 mph spell a catastrophic, "get out" (evacuation) situation (Norum 1980).

White spruce is also found in interior Alaska; typically occurring in riparian areas, and offering the opportunity to slow, if not stop, fire spread. White spruce stands often meet black spruce stands near lakes or streams, and form a very different fuel situation than black spruce; usually with a higher moisture content that fire often cannot pass through. While, during most burning conditions, white spruce stands offer an opportunity to slow the progress of a fire; a large load of dead and down fuels can produce a smoldering surface fire which may be difficult to extinguish. Under dry conditions and especially with steep slopes or strong winds, extremely intense fires can occur; and, in years of extended drought conditions, white spruce stands should not be considered a fuel break. White spruce burn at similar intensities to black spruce fires; and, as white spruce are generally taller, the spotting potential is even higher. Due to the nature of their shallow root systems, trees can also fall after the duff layer has been consumed, a safety concern for firefighters.

Tussock tundra occupies large portions of Alaska. It is usually found on flat to gently rolling terrain in western Alaska, and the lower one-third of gentle slopes in the Alaskan interior. The proportion of cured or dead material in tussock tundra has a pronounced effect on fire spread and must be carefully estimated. Knowledge of RH thresholds is key to estimating fire behavior in tussock tundra.

3.2.3.1 Fire Hazard Assessment

Along with the broader Delta Junction area, DTA East has a long history of wildfires. The fire management strategy for this area is addressed through a three-phase program: (1) prevention, (2) hazard fuel reduction, and (3) stationing of an Initial Attack Response Team during training events. Ignition sources for the DTA area, associated with both military training and other non-military actions (lightning and recreational use), will continue to cause fires in DTA East, as they have in the past. In general, large fires happen during hot, dry, and windy conditions.

3.2.3.1.1 Canadian Forest Fire Danger Rating System

The Delta Junction area's wildfire history originates from various causes, including both human activities and lightning. Weather patterns in the Delta Junction area occasionally stimulate extreme fire risk and behavior. USARAK use of the Canadian Forest Fire Danger Rating System (CFFDRS) reduces the likelihood of military-caused fires, primarily by restricting certain training activities, based upon fire risk.

Certain military activities are restricted when thresholds of wildfire risk are reached, as required by USARAK Range Regulation, 350-2 (i.e., use of pyrotechnics, smoke pots, and grenades may be restricted when fire danger is high and extreme, and smoke grenades and star-cluster flares will be used only for emergency operations during high and extreme fire danger times) (USARAK 2004b). Weather readings are collected by the USARAK Fire Department and used to calculate the fire danger rating according to the CFFDRS. The USARAK Fire Department provides the rating to Range Control at DTA, which restricts the use of munitions and pyrotechnics as the fire danger increases. The four fire index rating categories used by USARAK are extreme, high, moderate, and low (Table 3.2.3.a).

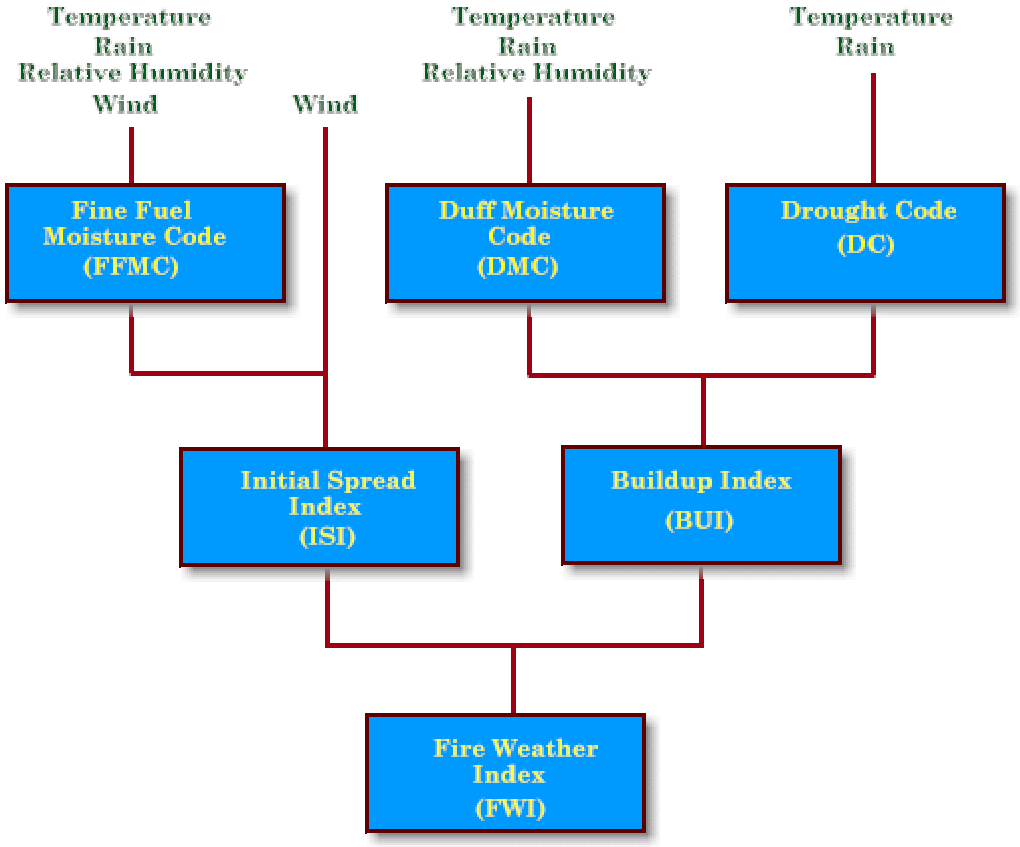
Table 3.2.3.a USARAK Fire Index Rating Categories

Fire Index Rating	Definition
Extreme	During dry and warm weather conditions, wildfires ignite very easily, may burn with very high intensity, and may have a very high potential for rapid fire spread. Typical fire behavior generally includes continuous crownfires, an active flaming front, firewhirls, massive convection columns, and spotting beyond one half- mile ahead of the flaming front. These fires are definitely dangerous to personnel and equipment. Control efforts at the head of the fire are ineffective. Fires present serious control problems, as they are virtually impossible to contain until burning conditions improve.
High	During dry and warm weather conditions, wildfires ignite easily, may burn with high intensity, and may have a high potential for rapid fire spread. Typical fire behavior may include crownfires, an active flaming front, and spotting as far as ½ mile ahead of the flaming front.
Moderate	Under dry and warm weather conditions, fires burn with moderate intensity and have a moderate potential for fire spread. Typical fire behavior may include creeping, short runs of active fire in fuel jackpots, and occasional torching.
Low	During dry and warm weather conditions, fires burn with low intensity and have low potential for fire spread. Fire behavior may include smoldering and intermittent creeping.

A fire index rating, computed by USARAK, provides general information about potential fire behavior at selected sites (Table 3.2.3.a). The fire index, as determined by the USARAK Fire Department, is based on the CFFDRS, which is the fire danger rating system used by BLM, Alaska Fire Service (AFS) and the State of Alaska. Of the fire danger indicators within the CFFDRS, USARAK uses the fire weather index (FWI) as an indicator of fire intensity and spread potential. The FWI tracks the effects of weather on forest fuels, producing an estimate of potential fire danger and fire behavior in an area adjacent to a weather station where weather data are recorded. The FWI is based on the moisture content of three classes of surface forest fuels, plus the effect of wind on fire behavior (AFS Website http://fire.ak.blm.gov).

Using the FWI system, for a particular weather station (in the case of DTA East, the weather station is located at Allen Army Airfield), fuel moisture is added in the form of precipitation and subtracted in the form of drying. Precipitation is the only input component that will add fuel moisture while the other inputs of temperature, relative humidity, wind speed, and time of year control the rate of drying. The FWI system consists of six components: three primary indexes, or codes (the Fine Fuel Moisture Code (FFMC), the Duff Moisture Code (DMC) and the Drought Code (DC)), representing fuel moisture for each of the three fuel layers; two intermediate indexes (Initial Spread Index (ISI) and the Buildup Index (BUI)), representing rate of spread and fuel consumption; and a final index representing fire intensity as energy output per unit length of fire front (FWI) (AFS Website http://fire.ak.blm.gov). The FWI system is depicted in Figure 3.f. The FWI is used by USARAK to establish daily range use restrictions.

Figure 3.f Definition of the Fire Weather Index (FWI)



Currently, the USARAK Fire Chief is responsible for computing and disseminating the FWI on a daily basis during fire season. Information on weather, obtained from an AFS website, provides the Fire Department with the information used for computation of the FWI. Typically, the AFS relies more upon the FFMC in analyzing fire ignition potential in the spring, due to its emphasis on ignition. As the summer season progresses, the DMC and the DC along with FFMC, are assessed for fire potential due to the progressive drying of the organic layers. Prior to 1999, the USARAK Fire Department primarily used the FFMC to determine Fire Index Ratings. In 1999, USARAK replaced the FFMC with the FWI in computing Fire Index Ratings. The specific methodology for FWI computation by the USARAK Fire Department, and other technical aspects of this program, are coordinated annually in a Memorandum of Agreement between USARAK G-3, AFS, the USARAK Fire Chief, and the United States Air Force (USAF).

The Fire Index Rating (as determined by the USARAK Fire Chief based on the FWI) is disseminated to each Range Control Office daily, is applicable to that particular area, and is valid for 24 hours. This information is provided by a series of remote sensors located at Allen Army Airfield and provides timely, accurate information regarding the FWI conditions. The sensors are part of the statewide fire weather system and are maintained by AFS and state of Alaska, Division of Forestry. The Range Control Office is responsible for obtaining the daily fire index rating and disseminating that information to units using the range. Table 3.2.3.b shows a history of fire index ratings assigned at DTA.

Table 3.2.3.b Fire Index Ratings at DTA from 1995 to 2003

Year[1,2]	Number of Days			
	Low	**Moderate**	**High**	**Extreme**
1995	10	10	59	0
1996	4	11	13	21
1997	19	9	66	7
1998	25	22	49	0
1999	33	13	20	25
2000	61	38	34	24
2001	38	53	54	22
2002	65	51	24	21
2003	36	41	49	52
2004 (as of September 29, 2004)	30	34	45	39
Total	**321**	**282**	**413**	**211**

[1]Prior to 1999, the FFMC was the primary index used to determine the fire index rating. Use of the FWI began in 1999, and is currently used to determine the fire index rating.
[2]Records exist only for the fire season, which is typically from early April to late August.

3.2.3.1.2 Fire Hazard Assessment of USARAK Lands

In fire-prone areas; climate, human activity, and types of vegetation (or fuels) determine the level of wildland fire potential. USARAK compiled fuel type maps for DTA East (Appendix, Figure 3.g). Common fuels found on DTA East include the following (Musitano et al. 2002):

Black spruce – These stands are highly flammable and are generally located in areas with wet soils and cooler, north-facing aspects. Crown fires are common and typically result in extensive mortality.

White spruce – White spruce is less flammable and generally located in lowland riparian areas. Crown fires may occur during drought conditions.

Mixed spruce/hardwood stands – In these stands, the conifers are generally white spruce with black spruce sometimes present. Black spruce is highly flammable and susceptible to crown fire, while white spruce is both less flammable and less conducive to crown fire. The associated hardwoods are generally less flammable and may include birch, aspen, and/or cottonwood. Surface fuels include mosses, lichens, leaf litter, grasses, and shrubs. Fires in these mixed stands are generally exhibit moderate intensity.

Bluejoint reedgrass – This species occurs in patches on DTA East, and may occur in association with hardwoods and mixed forest stands, or may dominate clearings. Fires within this grass start easily, spread quickly, and may burn intensely.

Tundra – In these areas, very flammable grasses dominate. Dwarf birch and willow may be present and are generally highly flammable, especially if they have a high lichen content. In alpine tundra, short shrubs, mosses and lichens dominate. Vegetation in these areas ranges from moderately to highly flammable.

To compile fuel maps, the vegetation described above was grouped into four fuel type categories based on the Canadian Forest Service fuel type designations (Table 3.2.3.c).

Table 3.2.3.c Canadian Forest Service Fuel Types Used for USARAK Fuel Maps

Fuel Type	Composition	Fuel Status
C-2 Boreal Spruce	Moderately well-stocked black spruce stands on both upland and lowland sites.	Most likely fuel to burn.
O-1B Grass/Herb	Continuous standing grass and accumulated litter.	Most likely to burn during spring and fall.
C-1 Spruce-Lichen Woodland	Open black spruce with dense clumps of white birch, well-drained upland sites.	Will burn only in high drought stress times, otherwise not too flammable.
M-2 Boreal Mixed wood	Boreal conifers and northern hardwoods.	Least likely fuel to burn. Fuel types are differentiated by season and percent conifer composition.

Fire hazard assessments were conducted on USARAK lands in 2002 by AFS fuels management specialists, with the assistance of USARAK Forestry personnel, to evaluate the potential implications of siting military ranges in certain areas. An increase in overall military range construction on Army lands created the need to identify and prioritize fuel reduction efforts. These assessments provided a high, moderate or low potential fire behavior rating, based on existing vegetation, topography, and general area weather characteristics; and are described in the following sections of this EIS. These assessments were based on established AFS fire hazard assessment methods.

3.2.3.1.2.1 Fire Hazard Assessment at Eddy Drop Zone

The Eddy Drop Zone study area has a hazard assessment of high. The fuels are continuous stringers of black spruce, dwarf black spruce and mixed hardwood with black spruce. Understory vegetation includes bluejoint reedgrass, mosses, and lichens. Localized weather patterns may create extremely hazardous fire situations. Typically, wind-driven fires in black spruce are high in intensity and they pose potential threats to state lands and private homesteads along the northern boundary (Musitano et al. 2002).

3.2.3.1.2.2 Fire Hazard Assessment at Donnelly Drop Zone

The Donnelly Drop Zone study area has a hazard assessment of moderate. Fuels within this area are continuous black spruce with pockets of hardwoods. Understory generally consists of mosses and lichens. Based on the fire history and historical weather patterns, the area is very susceptible to high winds and fire starts. Typical fires in this area exhibit high rates of spread and intensities. However, local fire scars (including the 1999 Donnelly Flats fire and the 1987 Granite Creek fire), the presence of hardwoods, and an established road system all serve as natural fire breaks that reduce the risk of fire spread, and prevent this area from being given a hazard assessment of high (Musitano et al. 2002).

3.2.3.1.2.3 Fire Hazard Assessment at North Texas Range

The North Texas Range study area has a hazard assessment of low to moderate. Within the area, fuels are an alpine tundra fuel type, consisting mainly of grasses/sedge willow, alder, short shrubs and mosses, with a few pockets of black spruce. The risk of fire spread may be moderate to high depending on fuel and weather conditions. Old fire scars to the east and northeast, and the Delta River to the west, may serve as fuel breaks to slow the spread of fire, giving this area a lower hazard assessment (Musitano et al. 2002).

3.2.3.2 Fire Policy

Fire management on USARAK installations is required by the Sikes Act and by Army Regulation (AR) 200-3, as well as the Resource Management Plan mandated under Public Law 106-65, *Military Lands Withdrawal Act*. Specific fire management requirements are stated in a 1995 Memorandum of Understanding between the BLM, AFS and USARAK, as well as the Army Wildland Fire Policy Guidance (Department of the Army 2002a).

Effective wildland fire management in Alaska requires multi-agency cooperation and coordination. Fire management on USARAK lands is a joint effort between USARAK and the AFS. The agencies have developed two inter-service support agreements, which establish AFS responsibility for all fire detection and suppression on military lands (Alaska Fire Service and USARAK 1995a, b). In exchange, the Army provides AFS (a Federal agency) with certain buildings, utilities, land, training services, air support, and other support services.

AFS also has a Reciprocal Fire Management Agreement with the state of Alaska, Division of Forestry (Alaska Fire Service and State of Alaska 1998). Under this agreement, the agencies have implemented a coordinated fire suppression effort, and have identified areas where each agency has agreed to provide wildland fire suppression, regardless of land (state or Federal) ownership.

Fire management planning in Alaska has been conducted by agreements executed on an interagency, landscape-scale basis since the early 1980s. These efforts standardized policies and procedures among land managing agencies. All Federal, State and Alaska Native land managers utilize statewide, four wildland fire suppression management options (Critical, Full, Modified, and Limited). Each management option is defined by objectives, management constraints, and values to be protected. Options are assigned on a landscape scale across agency boundaries. Management option categories are designed to be ecologically and fiscally sound, operationally feasible, and sufficiently flexible to respond to changes in objectives, fire conditions, land use patterns, resource information, new technologies, and new scientific findings. The designation of a management option establishes the strategies (appropriate management responses) assigned to meet land use and resource objectives. Site-specific designations (Critical, Full, Avoid and Non-sensitive) are used for small sites within the landscape scale classification. Management option designations are based upon an evaluation of USARAK legal mandates, policies, regulations, resource management objectives, and local conditions.

Critical Management Option – The Critical management option is assigned to populated areas, USARAK-managed lands adjacent to populated areas, and in the wildland/urban interface. National Historic Landmarks are designated Critical, in compliance with State and Federal regulations. Wildland fires that occur on Critical management option lands are given the highest priority for suppression action. Protection of life or occupied property has priority over National Historic Landmarks. The appropriate management response to wildland fires is aggressive and continuous without compromising firefighter safety.

Full Management Option – This option provides for protection of cultural and paleontological sites, USARAK-developed recreational facilities, physical developments, administrative sites and cabins, uninhabited structures, high-value natural resources, and other high-value areas that do not involve the protection of human life and inhabited property. The appropriate management response to a wildland fire is aggressive action to minimize resource damage and suppress the fires within the smallest reasonably possible acreage. Wildland fires within (or near) a Critical management area receive a higher priority for suppression than a fire in a Full management area.

Modified Management Option – This option provides an appropriate management response to account for seasonal variations in risk, allowing the Full management option, when risks of large wildland fires are high; and the Limited management option, when such risks are low. The conversion (transition) date is based on the input of land managers, weather trends, and statewide fire occurrence, and is set each year by the Alaska Wildland Fire Coordinating Group (AWFCG). This date is traditionally July 10. The appropriate management responses for fires occurring within this designation are:

- Before the conversion date, fires would be contained with initial attack forces. If a deviation from the appropriate management response is necessary, wildland fire use "for natural resource benefit" may be considered as a management alternative. These natural resource benefits come about through vegetation management, as wildland fires produce a mixture of serial stages that maintain watershed condition, ecosystem health, and habitat conditions for fish and wildlife.
- After the conversion date, a fire may be allowed to function in its natural ecological role, maintaining routine surveillance to ensure that identified site-specific values and adjacent higher priority management areas are protected. Direct or indirect suppression actions may be initiated to keep a fire within the boundary of the management option or to protect identified sites. The use of a wildland fire as a natural resource benefit is an approved response.

Limited Management Option – This designation focuses on firefighter safety and natural resource benefit, and is assigned to Restricted Areas or Hot Zones, where no "on the ground" fire fighting can be accomplished, due to danger of unexploded ordnance (UXO). The natural resource benefits come about through vegetation management, as wildland fires produce a mixture of serial stages that maintain watershed condition, ecosystem health, and habitat conditions for fish and wildlife. The natural mosaic of habitats and plant diversity for all wildlife species, and for subsistence activities, is sustained and enhanced. Wildland fires occurring within this designation are allowed to burn under the influence of natural forces. Suppression actions may be initiated to keep a fire within the boundary of the management option or to protect identified higher value areas/sites. Site-specific areas that warrant higher levels of protection may occur within limited management areas. Appropriate suppression actions to protect these sites will be taken when warranted, without compromising the intent of the Limited management area.

The most appropriate management response is to allow fire to function in its natural ecological role while conducting routine surveillance to observe fire activity and to protect site-specific values or adjacent higher priority management areas. Direct or indirect suppression actions may be initiated to keep a fire within the boundary of Limited, to protect identified sites, or to restrict fire size when extensive statewide activity has overtaxed suppression resources.

Site Specific Option - In order to prioritize assignment of suppression forces, and determine the appropriate actions to be taken within the landscape-scale management option classifications, site designations of Critical, Full, Avoid and Non-sensitive have been established for structures, cultural and paleontological sites, small areas of high resource value, and threatened and

endangered species habitat; providing fire suppression agencies more specific guidance for small sites.

- Sites designated Critical and Full are to be protected from fire.
- Sites designated Avoid are areas where fire suppression efforts should be avoided and effects from suppression efforts minimized. All aircraft should be restricted from these areas.
- Sites designated as Non-sensitive are acknowledged by the Field Office staff, but require no additional suppression efforts or restrictions.

3.2.3.2.1 Fire Policy at Eddy Drop Zone, Donnelly Drop Zone and North Texas Range

Currently, DTA East is designated as a Full management option area due to the close proximity of the Delta Junction community and the cantonment area of DTA (Fort Greely) (Appendix, Figure 3.h). This area is subject to high winds and extreme fire behavior. The northern portion of the Fort Greely Main Post is a Critical management option area. The Army also has structures at risk throughout DTA East. These resources have been identified and mapped. DTA East surrounds a portion of private and state land known as the "Key Hole" (USARAK 2002b). The SDZ associated with the North Texas Range alternative is within a Limited management option area. The SDZs associated with the Eddy Drop Zone and Donnelly Drop Zone alternatives are within the Full management option.

3.2.3.3 Fire History

Fires are common at DTA. According to Jorgenson et al. (2001), 59% of DTA has burned since 1950, and a considerable portion has burned more than once. Approximately 16% of DTA has burned within the past 30 years, and, based on fires recorded on the installation since 1950, 1.2% of the area has burned annually.

Between 1950 and 2002, 53 known fires burned over 93,000 acres on and around DTA East (Table 3.2.3.b). The U.S. Department of Agriculture and the U.S. Department of the Interior classify a "large" fire as 100 acres or larger, in timber fuel types, and as 300 acres or larger, in grass fuel types (USDA 2004). Eleven large fires (greater than 100 acres) have burned on or around DTA East since 1950.

In 1999, the Donnelly Flats Fire burned approximately 18,720 acres of DTA East and Main Post. This fire was reported near Donnelly Dome to Delta Area Forestry at 1000 hours on June 11. This area is predominantly black spruce and is located just north of the Alaska Range on DTA. It is influenced by topographically and glacially induced winds. Local weather was clear, 76 °F, variable winds at 10 mph, with a relative humidity of 19%, and the vegetation was very dry. The fire spread steadily to the south. At 1710 hours, the size of the fire was estimated at 150 acres. At 2100 hours, the fire had grown to one half mile wide and four miles long. On June 12, the fire grew to 400 acres. On June 13, east winds were blowing at 10 mph, it was 80 °F, and the relative humidity was in the low 30s. These conditions caused a large increase in fire behavior, pushing it westward. At 1500 hours, the fire began to threaten residences along the Richardson Highway and Alyeska Pump Station Nine. At 2130 hours, the fire crossed the southern most fuel break, which was the pre-established trigger point for initiating the Fort Greely evacuation plan. At 2200 hours, Delta Area Forestry initiated the evacuation of southern areas of Delta Junction. By June 14, certain areas were secured, and by June 16, weather conditions (higher relative humidity and rain) caused the fire to diminish. A total of 15,226 acres of military land within a Full management option area was burned, and 305 acres of military land within a Critical management option area were burned. Approximately 2,329 acres of BLM-managed land within a Full

management option area were burned, and 860 acres of privately-owned land within a Full management option area were burned. The fire was declared "out" at 18,720 acres on September 23, 1999.

The AFS maintains incident reports for fires reported on the lands used by USARAK; though, record keeping has varied over the years, and some fires have more information available than others. All reported fires that have occurred on USARAK lands are listed in Table 3.2.3.d and Appendix, Figure 3.i, which illustrate the recorded large fires that have occurred on DTA East within the alternative sites, including the 1999 Donnelly Flats Fire, 1987 Granite Creek Fire, 1981 Bolio Lake Fire, and the 1954 PK Fire.

Table 3.2.3.d History of All Known Fires That Have Occurred on DTA East

Date	Name	Acres	Source	Cause	Specific
9/3/1950	Delta Flat Fire	10.0	mil. training[1]	incendiary	unknown
6/26/1951	Army Firing Range	5.0	mil. training	incendiary	artillery/bullets
4/16/1953	Black Rapids	400.0	mil. training	incendiary	artillery/bullets
6/5/1954	P.K. Fire	50.0	human	military	debris burning
1954	Granite Mountain	18,000.0	mil. training	maneuver	vehicle exhaust
5/23/1955	Sam Kelly	0.1	human	civilian	cigarette
4/23/1956	Meadows Rd	1.0	mil. training	incendiary	phosphorus shells
5/17/1956	Meadows	4.0	mil. training	incendiary	phosphorus shells
5/31/1956	Bolio Lake	0.2	human	fisherman	campfire
7/17/1958	Bolio Lake S-4	30.0	human	unknown	unknown
5/20/1960	Donnelly Dome	200.0	human	unknown	unknown
7/14/1960	Donnelly Dome N-5	1.0	mil. training	unknown	unknown
8/5/1960	Donnelly Dome E-2	3.0	human	military	construction
4/16/1970	Quartz Lake	150.0	human	campfire	cooking fire
5/31/1973	Buffalo Ctr.	0.1	unknown	unknown	unknown
4/23/1977	Donnelly	50.0	mil. training	incendiary	unknown
5/14/1978	Big SO 16	9.0	human	unknown	unknown
5/16/1980	Bolio Lake	4.0	mil. training	incendiary	unknown
3/18/1981	Bolio	8,000.0	human	not available	not available
5/11/1983	Big SE 11	15.0	mil. training	incendiary	unknown
7/31/1985	Jarvis	0.1	human	civilian	cigarette
6/2/1986	FBK SE 85	0.1	human	unknown	unknown
4/9/1987	FBK E 83	0.5	unknown	unknown	unknown
4/11/1987	Texas Range	100.0	human	unknown	unknown
5/22/1987	Granite Creek	46,078.0	human	not available	not available
5/19/1990	A008	2.5	mil. training	incendiary	unknown
8/4/1990	12064	0.2	mil. training	incendiary	flare
6/18/1991	Mark Lake	3.0	human	incendiary	unknown
6/27/1991	Golfballs	0.1	natural	lightning	n/a
8/9/1991	B735	4.0	human	unknown	unknown
9/27/1991	B802	20.0	mil. training	incendiary	maneuvers
4/13/1993	B001	21.0	mil. training	incendiary	blasting
5/13/1993	Jarvis Ck	0.1	human	unknown	warming fire
6/5/1993	1397 Road 2	4.5	natural	lightning	n/a
6/5/1993	B265	300.0	natural	lightning	n/a
6/5/1993	B266	895.0	natural	lightning	n/a
6/30/1993	Muskeg Hill 1	1.0	mil. training	incendiary	unknown

6/30/1993	Muskeg Hill 3	0.2	mil. training	incendiary	unknown
6/30/1993	B444	5.0	mil. training	incendiary	unknown
6/30/1993	B455	0.1	mil. training	incendiary	unknown
6/30/1993	B457	2.0	mil. training	incendiary	unknown
6/30/1993	B458	0.5	mil. training	incendiary	unknown
7/18/1993	B622	2.5	mil. training	incendiary	flare
8/31/1994	B623	0.3	mil. training	incendiary	unknown
8/31/1994	A624	1.0	unknown	unknown	unknown
10/01/1994	Dry Creek	0.1	human	unknown	warming fire
5/13/1995	B164	1.5	mil. training	incendiary	unknown
5/30/1998	Surprise	0.1	human	children	matches
4/17/1999	Bolio Lake	7.0	unknown	unknown	unknown
6/11/1999	Donnelly Flats	18,720.0	human	unknown	unknown
5/9/2001	Winter Ridge	110.0	mil. training	incendiary	tracers
7/20/2001	Big Lake	0.1	mil. training	incendiary	unknown
6/9/2002	OP Lakes	0.5	mil. training	incendiary	unknown

[1]Military training.

The four potential sources of fires are 1) military training; 2) human, either military or civilian, and not associated with military training; 2) natural (lightning); or 4) unknown. If source of the fire was military training, the "cause" category defines the activity that started fire. If known, the "specific" category lists what exactly was the ignition source (e.g., debris burn, cigarette, flare, bombing, etc.). If the cause is human, the cause defines the class of the individual that was responsible (e.g., hunter, civilian, etc.).

Incendiary devices from military training are the major cause of fires on installation lands. Specific devices include artillery/bullets, phosphorous shells, blasts, and flares. Other, less common causes of fire are lightning, field burning, cigarettes, recreation, trash burning, and campfires. Of the 53 recorded fires between 1950 and 2002, the source of 26 fires is attributed to military training; 19 to human activities; and four to natural sources; and the source of the final four fires is unknown (Table 3.2.3.d). However, only three of the 26 fires attributed to military training were greater than 100 acres (Black Rapids, Granite Mountain, and Winter Ridge).

3.2.3.3.1 Fire History at Eddy Drop Zone

The southeastern corner of Eddy Drop Zone study area burned in 1954, and the eastern half burned in 1987 (Appendix, Figure 3.i). At the Eddy Drop Zone study area, a 1987 fire burned approximately 46,000 acres. Factors contributing to the fire included fuel type, extreme winds (up to 50 miles per hour), low relative humidity (approximately 25%), and warm temperatures (65 °F). The fire started in a scattered black spruce and grass/tundra area, and the specific cause was never determined, though it was thought to be caused by non-military human activity. Dozers, fire engines, retardant ships, and hand crews were used to control the fire. The total fire control cost was $2.6 million.

3.2.3.3.2 Fire History at Donnelly Drop Zone

The eastern third of the Donnelly Drop Zone study area burned in 1987, and the extreme northern edge of the area burned in 1999 (Appendix, Figure 3.i). A fire was discovered in 1990 and burned approximately 0.2 acres within the study area. The fire was started by a military trip flare, which caught nearby grass on fire and spread to a berm pile and into black spruce. Weather conditions included calm winds, a 43% relative humidity and a temperature of 63 °F. A dozer and a hand

crew of five people extinguished the fire. In 1991, a small fire was started by lightning and burned approximately 0.1 acres within the study area.

3.2.3.3.3 Fire History at North Texas Range

Much of the North Texas Range study area burned in 1981 (Appendix, Figure 3.i). The fire burned a total of 8,000 acres and was influenced by the existing fuel type, warm temperatures, and high winds. The fire burned in tundra and scattered spruce, and the cause of the fire is unknown. Dozers and hand crews were utilized to control the fire. A smaller fire in 2001 burned approximately 110 acres, starting from a .50 caliber tracer round in lowland tundra grass. A dozer and an engine crew were used to extinguish the fire.

3.2.3.4 Fuels Management

Three management actions are used by USARAK to prevent wildfires. First, a fire danger rating system is used to reduce the likelihood of a fire by limiting military activities, (Table 3.2.3.a). Certain military activities are restricted when thresholds of wildfire risk are reached, as required by USARAK Range Regulation, 350-2 (USARAK 2004b). Second, wildfire danger is reduced through the mechanical removal of accumulated fuels and through prescribed burning. Another method of fuel reduction involves the construction and maintenance of fire or fuel breaks. The third action of the fire management is that of an Initial Attack Response Team. This wildland fire team (including a fire engine) remains “on scene” during all military training activities, to provide both a wildfire safety briefing to incoming training units, and the rapid initial response to all wildfires in the area.

Recent fuels management projects on DTA include the removal of dead spruce, creation of fuel breaks, and prescribed burns. These projects reduce fuels, removing highly flammable spruce and promoting regeneration of less flammable hardwoods.

3.2.3.4.1 Fuels Management at Eddy Drop Zone

In coordination with AFS, USARAK is currently conducting a landscape-scale fire mitigation project (Appendix, Figure 3.j) as part of the USARAK fuels management plan. Multiple management techniques are being used to lessen the probability of fires moving off military lands onto private property, or fires starting on private property and moving onto military lands.

The Jarvis North Fire Mitigation Project was initiated in 1999 to mitigate potential fire risks from increased military use of DTA East (Table 3.2.3.d) (USARAK 2003b). Directly after the Donnelly Flats fire in 1999, the area between Eddy Drop Zone and the Alaska Highway was identified as the last continuous patch of black spruce at DTA. Fires burning in continuous black spruce are the most difficult fires to extinguish, especially if winds are high. Research was conducted on different possible solutions to reduce the risk of wildfires in this area, from mechanical treatments to prescribed fire. Mechanical treatments were deemed the best methods, given the cost and complexity of the project. The AFS is actively involved in planning and implementing this project (Rees 2004). The State of Alaska Division of Forestry was consulted during the planning phase and has participated in project site visits (Rees 2004). In developing the project criteria, fuel types and prevailing climatic factors (particularly high winds), were considered. The potential increased fire risks from military lands, and possible subsequent threat to private lands and residences, was recognized and incorporated into project planning.
As part of the Jarvis North Fire Mitigation Project, a rapid stand conversion from black spruce to a pure deciduous stand began in 2003, and will continue over a period of five years. Deciduous

stands of hardwoods are used to "stage" fire suppression activities, as typical fire intensity in hardwoods is low to moderate, less than that of black spruce stands. By converting spruce stands to hardwoods within the fuel break, potential fire intensity will decrease and contribute to overall fire suppression tactics. If a fire starts in DTA East, the less volatile deciduous stand will stop or slow the northward progression of a low intensity fire. The location of the fuel break begins at Buffalo Drop Zone to the west and continues to South Pat Lake to the east (Appendix, Figure 3.j). The project has been organized into three major phases of operation (Table 3.2.3.e).

Table 3.2.3.e Description of Jarvis North Fire Mitigation Project

Phase of Operation	Description
Phase 1	In the summer field season of 2003, crews started thinning operations in areas delineated on Appendix, Figure 3.j, and completed approximately 36 acres. This thinning removes the spruce component from birch and aspen stands. This fuel break would serve as an initial point of access where suppression tactics can be applied. Prior to clearing operations, access was limited north of 33-Mile Loop Road. Stand conversion began in late spring 2004. Large equipment, such as a hydro-ax and shear-blade, was used to start stand conversion. All coniferous overstory vegetation was mechanically removed and piled into windrows within the treatment area. Windrows would be burned over the next two winters. A burn plan would be developed for windrow burning, and all burn and air quality permits would be acquired prior to actual burning. The organic mat would be removed, exposing bare mineral soil after windrows have been burned. During the spring of 2006 and 2007, collected seed would be spread in areas mechanically treated. Organic material would be mulched and mixed with the soil to enhance seed establishment. Approximately 210 acres would be treated with large equipment. The swath of treated areas will be 150 to 300 feet wide. A local contractor would be used to accomplish mechanical treatments.
Phase 2	This phase would determine local values, such as community, life and property, and identify the risks associated with them. Current funding shortages have delayed this portion of the mitigation project. Housing sub-divisions would need treatment to meet defensible space specifications as outlined by the Firewise program. All large volatile vegetation would need to be removed 100 ft from structures, and smaller, less volatile vegetation would need to be cleared 30 ft from structures and limbed to remove ladder fuels. AFS is trying to commit funding to this phase of the project. AFS would need to work with state of Alaska agencies and private homeowners to identify what work would be accomplished and timelines in which to accomplish the project.

Phase 3 (continuous)	Phase 3 would expand the fuel break with selected removal of vegetation within the area of interest, including a detailed assessment of wildland fire fuels just south of the intended fuel break (Appendix, Figure 3.j). The treatment would entail clearing of the forest in a series of polygons totaling to approximately 200 to 300 acres in a multi-year project. This phase would support the completion of two objectives: 1) breaks in the homogenous black spruce stands would aid in reducing the potential of a high intensity fire and 2) breaks would serve as wildlife habitat improvements. Similar stand conversion techniques would be used in this phase as were used in Phase 1. The success of the project, however, is not dependant on Phase 3. The purpose of Phase 3 is only to decrease the likelihood of high intensity crown fires.

Under extreme fire danger conditions, the Jarvis North Fire Mitigation Project will not, by itself, prevent the spread of wildfire onto adjacent lands (USARAK 2003b). A more comprehensive approach, encompassing (1) current strict adherence to USARAK Range Regulations, (2) increased application of range use restrictions (based on risk index ratings), (3) focused hazard fuel reduction, and (4) stationing of an Initial Attack Response Team during training events, will greatly reduce fire ignition potential.

Specific supplemental National Environmental Policy Act (NEPA) documentation has been prepared for the fire mitigation project. All necessary wetland permits, cultural resource surveys, and burn plans have been completed (USARAK 2003b).

3.2.3.4.2 Fuels Management at Donnelly Drop Zone

The Jarvis North Fire Mitigation Project also applies to the Donnelly Drop Zone area; enabling a fuel break to allow firefighters to apply suppression tactics, and provide additional suppression to any high intensity crown fire (Appendix, Figure 3.j). This project is designed to stop or slow the northward spread of a low intensity fire originating in the Donnelly Drop Zone area.

No additional fuel management activities are occurring within the Donnelly Drop Zone study area.

3.2.3.4.3 Fuels Management at North Texas Range

A fuels assessment has been completed by USARAK for the Hayes Lake area near the North Texas Range study area. This project addresses the fire potential in the area adjacent to the Delta River Impact Area and its potential spread onto adjacent state of Alaska lands to the north of DTA. The fuels in this area are a mosaic of different spruce types, moving northward, from an upland moist needleleaf forest to a lowland wet needleleaf forest. Along the Delta River, the fuel type is a riparian white spruce stand. The riparian white spruce and the upland moist needleleaf forest have a history of low fire occurrence. Adjacent fuels include hardwood stands of paper birch with herbaceous understory. Historical weather shows a strong southerly wind pattern with common wind gusts exceeding 30 to 40 miles an hour, leading to extreme fire behavior. This is evident from documented observations and burn patterns from the 1998 Carla Lake and the 1999 Donnelly Flats fires. It is recommended that the area south of the winter trail be sectioned into units, and burned. The existing trails and dozer lines provide established areas for fuel breaks and anchor points to support fire suppression operations. A major portion of the area is located in the firing fan of the DTA small arms range.

The AFS, in cooperation with USARAK and state of Alaska, Division of Forestry, conducted two prescribed burns near the North Texas Range study area, in the spring of 2003 and 2004 (Appendix, Figure 3.j). Approximately 3,000 acres were burned in 2003 and another 2,000 acres were burned in 2004. The outcome of these burns was successful, with 70% of the light flashy fuels (grass) being consumed. The goal of such burns is to reduce flammable surface fuels, mainly the open grass thatch that dominates the area. Additional objectives of the Texas Range Burn Plan are to reduce buildup of flammable fuels in and around Texas Range, to mitigate the threat of wildfire starts, and to reduce chances of fire escape. The reintroduction of an annual or biannual spring or fall burn cycle to the area would keep fuel buildups to a minimum. An additional burn is scheduled for 2006.

The Texas Range burn units are located 10 miles southwest of Delta Junction, bordering the east side of the Delta River, and five miles west of the Richardson Highway. Since the goal of the burn is to remove the grass thatch with minimal spruce mortality, an early spring or fall burn allows for protection of the spruce, due to wet or frozen surface fuels, while the elevated grass thatch is normally fully dried for burning.

USARAK is currently conducting hazard fuel reduction (dead and down tree removal) on the Collective Training Range (north of the proposed BAX and CACTF site) with a total treated area of 40 acres. The objective is to reduce potential of wildfire starts from tracers embedding in dead wood. This clearing will also enhance maneuverability at the range. Treated areas include buffers directly around targets and selected maneuver corridors.

DTA Range Control has requested that AFS and USARAK conduct a wildfire assessment of Bolio Lake Training Area (Bolio Lake to Texas Range to Windy Ridge to Delta River), including a hazard fuel reduction plan. The objective is to reduce the threat of wildfire starts, conducting an assessment, looking at future prescribed fires, and maintaining a semi open vegetation condition for military training.

3.2.4 NOISE

Issue 5: Noise impacts. The impact of construction and operation of the BAX and CACTF to existing noise levels was identified as a primary issue of concern during scoping. Additional information can be found in Section 1.9, *Issues Identified During the Scoping Process*.

Sound is a small-scale fluctuation of air pressure that typically follows a repetitive pattern (Olishifski and Hartford 1975). Noise is unwanted sound that can cause behavioral change, impair speech and normal activities, and damage hearing. General audible noises are those sounds heard everyday.

Human response to noise varies, depending on the type and characteristics of the noise, distance between the noise source and the receptor, receptor sensitivity, and time of day. The military noise environment consists primarily of three types of noise: transportation noise from aircraft and vehicles (including those used for construction), impulsive noise from armor and artillery firing and demolition operations, and noise from small arms ranges.

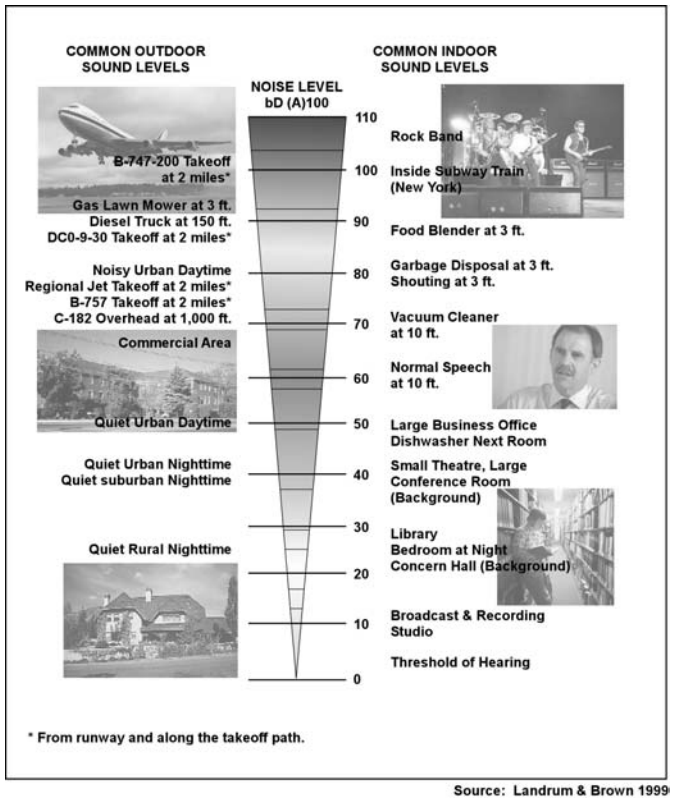
Many studies have analyzed noise impacts upon surrounding communities. Studied noise contours include small arms, transportation, aircraft, and impulsive noise. Some studies utilize annoyance levels to quantify dose-response levels, utilizing questionnaires and interviews to

reach conclusions. Other studies have analyzed actual complaints and subsequently evaluated the noise levels which generated the complaints.

The typical response of humans to noise is annoyance, a response that is remarkably complex and, considered on an individual basis, displays wide variability for any given noise level. Annoyance is the measured outcome of a community's response to survey questions on various environmental and other factors, including noise exposure. Although individual annoyance is sometimes measured in the laboratory, field evaluations of community annoyance are most useful for predicting the consequences of planned actions involving highways, airports, road traffic, railroads, or other noise sources. Factors directly affecting annoyance from noise include interference with communication and sleep disturbance. Other less direct effects include disruption of one's peace of mind, the enjoyment of one's property, and the enjoyment of solitude. The consequences of noise-induced annoyance are privately felt dissatisfaction, often publicly expressed as complaints to the installation or authorities. Not all those annoyed will complain, but it can be assumed that those who complain are annoyed.

Janssen (1980) described three levels of impact of noise to wildlife. Primary effects damage hearing organs and result in temporary or permanent loss of hearing. Secondary effects result in alteration of behavior (including startle response or movement away from the noise), or inducement of the physiological stress response. Tertiary effects result in population-level changes, including increased mortality, reduced reproductive rate, or habitat abandonment. While the effects of aircraft noise have been studied on a variety of wildlife species, less is known about the effects of artillery firing. The lower threshold of human hearing is 0 dBA. The threshold of pain for the human ear is approximately 140 dBA. Figure 3.k shows some common sound levels using the A-weighted scale.

Figure 3.k Typical Decibel Levels for A-weighted Noise Levels



Source: Landrum & Brown 1999

3.2.4.1 Army Noise Management

The Army's Environmental Noise Management Program, described in AR 200-1, *Environmental Protection and Enhancement*, is the primary tool the Army uses to analyze and manage noise generated by Army activities, including aircraft operations, range firing, and weapons testing. The goals of the program are to protect the health and welfare of people on (and off) installations affected by Army-produced noise, and to reduce community annoyance from environmental noise. The program seeks to achieve compliance with applicable noise regulations in a manner consistent with an installation's military mission.

The Environmental Noise Management Program requires installations to implement environmental noise policies to identify and control the effects of noise. Among these policies is the requirement to predict noise levels for long-range planning, including preparation of noise contour maps. The Army identifies and evaluates land areas with noise-sensitive land uses that are exposed to generally unacceptable noise levels. The Army uses the Day-Night average sound Level (DNL) to quantify the noise environment at Army installations. The DNL represents sound levels measured by totaling and averaging levels during a 24-hour period. A penalty of 10 decibels (dB) is assigned to noise events occurring between 10:00 p.m. and 7:00 a.m. the following morning, which compensates for lower nighttime background noise levels, as well as increased annoyance associated with events occurring at night. The DNL is a useful descriptor for noise because: (1) it averages continuous noise, such as a busy highway, and (2) it measures total sound energy over a 24-hour period. Thus, DNL effectively identifies a "noise dose" for a day.

AR 200-1 defines three noise zones (NZ): III, II, and I. The zones are developed using computer models. The models take all operations over the year and produce noise contours that represent the average DNL. Noise-sensitive land uses include, but are not limited to, residences, schools, medical facilities, and churches.

The NZ criteria used in AR 200-1 were developed based on recommendations made by the Federal Interagency Committee on Urban Noise (FICUN). C-weighting and A-weighting are two different scales that are used to assess noise impacts. The A-weighting is used to give emphasis to the frequencies that humans hear best. The C-weighting is used for sounds that have a high content of low-frequency energy. By using the C-weighting, the results reflect vibration levels that can be felt from low-frequency sounds. FICUN used existing social surveys that correlated A-weighted Day-Night average sound Levels (ADNL) from transportation noise sources with the percentage of the population highly annoyed, to develop guidelines for considering noise levels in land use planning (FICUN 1980). In addition to transportation noise sources, the ADNL is used to evaluate heavy equipment operations and small arms weapons firing (up to .50 caliber). For loud, short-duration impulsive sounds such as large caliber weapons firing (larger than 20 mm) and demolitions noise, the C-weighted Day-Night average sound Level (CDNL) is used (AR 200-1). The NZ limits and corresponding annoyance levels are summarized in Table 3.2.4.a.

The three NZ are:

Noise Zone I. NZ I includes all areas around a noise source in which the DNL is less than 65 dBA or less than 62 dBC. This area is usually suitable for all types of land use activities. However, this does not guarantee that training noise will not be heard in these areas.

Noise Zone II. NZ II consists of an area where the DNL is between 65 and 75 dBA or between 62 and 70 dBC. Exposure to noise within this area is considered significant and use of land within NZ II should normally be limited to activities such as industrial, manufacturing, transportation

and resource production. However, if the community determines that land in NZ II areas must be used for residential purposes, noise level reduction (NLR) features should be incorporated into the design and construction of the buildings.

Noise Zone III. NZ III consists of the area around the source of the noise in which the DNL is greater than 75 dBA for aircraft, vehicle, and small arms range noise; and greater than 70 dBC for noise from weapon systems larger than 20 mm and demolitions. The noise level within NZ III is considered so severe that noise-sensitive land uses should be excluded.

Table 3.2.4.a Noise Limits and Zones for Land Use Planning

Noise Zone	Percent of Population Highly Annoyed	Transportation and Small Arms (ADNL)	Large Caliber Weapons (larger than 20 mm) and Demolition (CDNL)
I	Less than 15%	Less than 65 dBA	Less than62 dBC
II	15%-39%	65-75 dBA	62-70 dBC
III	Greater than 39%	Greater than75 dBA	Greater than 70 dBC

Source: 1997 AR 200-1

3.2.4.2 Small Arms Noise

Small arms (up to .50 caliber) noise contours are generated using the Small Arms Range Noise Assessment Model (SARNAM) (U.S. Army 1996). The model incorporates the latest available information on weapons noise models (including directivity and spectrum), sound propagation, effects of noise mitigation and safety structures (e.g., walls, berms, ricochet barriers, etc.), and community response protocols for small arms noise. Model inputs include: range grid coordinates, number of firing lanes, distances to targets, firing azimuth, location and size of barriers, berms and baffles, and number of rounds, by weapon type, firing during daytime and nighttime hours.

3.2.4.2.1 Existing Small Arms Noise

Current DTA small arms noise contours stay well within the installation boundary. The land use within the contours is used for small arms training and they do not impact upon any noise-sensitive land uses. The noise levels from existing small arms activities are compatible with Army and Federal Guidelines (FICUN 1980).

3.2.4.3 Large Caliber Weapons and Demolition Noise

The noise simulation program used to generate noise contours for large caliber weapons (greater than 20 mm) and demolition noise is BNOISE2 (Hottman et al. 1986). The BNOISE2 program requires operational data concerning types of weapons fired from each range or firing point. The model input data include: the number and type of rounds fired from each weapon, the location of targets for each range or firing point, and the amount of propellant used to reach the target. Contours are generated from range utilization data and reasonable assumptions.

Noise levels may vary significantly depending on weather conditions. There are times when infrequent loud events may generate complaints in areas that are outside of the NZs, especially during weather conditions that favor sound propagation. In these instances, it is useful to supplement the NZs shown on the maps with information on instantaneous or single event noise levels. The peak levels from the impulsive noise generated by large caliber weapons firing can be used to anticipate the risk of complaints.

To evaluate the complaint potential from single impulsive sounds, a set of guidelines (Pater 1976) was developed by the Naval Surface Warfare Center. These testing guidelines are based on over 10 years of experience. These guidelines are shown in Table 3.2.4.b and represent the best compromise between cost, efficiency of range operations, and good community relations.

Table 3.2.4.b Impulse Noise Guidelines[1]

Predicted Sound Level, dBP	Risk of Complaints
Less than 115	Low risk of noise complaints.
115 – 130	Moderate risk of noise complaints.
130 – 140	High risk of noise complaints, possibility of damage.
Greater than 140	Threshold for permanent physiological damage to unprotected human ears. High risk of physiological and structural damage claims.

[1] For rapid-fire test programs and/or programs that involve many repetitions of impulse noise, reduce allowed sound levels by 15 dBP.
Source: Pater 1976

The distance and angle of firing are also important to the prediction of noise impacts to communities (Table 3.2.4.c). Noise levels are loudest in front of a discharging weapon. Thus, the peak level (dBP) is higher when an observer is standing 45 degrees from a firing weapon than someone directly behind the weapon. The Stryker Mobile Gun System (MGS) will be equipped with a 105 mm Tank Gun. The table below lists the average expected peak levels, and because of varying propagation conditions, the percentage of time those levels would be expected to reach levels that have a moderate risk of generating complaints (levels greater than 115 dBP).

Table 3.2.4.c Expected Noise Levels From Firing Inert 105 mm Tank Rounds

Azimuth Between Direction of Fire and Receiver						
Distance (miles)	**45° (front)**		**90° (side)**		**180° (behind)**	
	dBP Expected	% of time greater than 115 dBP[1]	dBP Expected	% of time greater than 115 dBP	dBP Expected	% of time greater than 115 dBP
1	118	74	117	67	105	3
2	107	12	106	8	94	0.1
3	101	2.3	100	1.5	87	0
4	96	0.6	95	0.4	83	0
5	93	0.2	91	0.1	79	0

[1]Greater than 115 dBP moderate risk of noise complaints; Less than 115 dBP low risk of noise complaints
Source: Catherine Stewart 2003, based on Pater 1976.

For example, at a distance of one mile and an angle of 45 degrees from the direction of fire, the probability of exceeding 115 decibels (dBP), which results in a moderate risk of noise complaints, would be exceeded approximately 74% of the time. At a 90° angle, from the same one-mile distance, the expected dBP would be 117, and moderate risk of complaints threshold of 115 dBP would be exceeded about 67% of the time. If the firing was in the opposite direction (180°), the expected dBP from one mile would be 105, and the 115 dBP threshold would be exceeded only 3% of the time. In addition, the 115 dBP threshold attenuates rapidly with distance. At 45 degrees, noise levels exceed 115 dBP only about 2% of the time at a distance of three miles. Using data such as these, as well as weather factors, the Army can plan range use to minimize nearby community disturbance.

3.2.4.3.1 Existing Large Caliber Weapons and Demolition Noise

Current DTA blast noise contours are contained within the boundary. The land within the noise contours is used for range activity and military training. The noise levels are compatible with Army and Federal Guidelines (FICUN 1980). Also, locations of firing points and direction of fire are such that the risk of noise complaints is low.

3.2.4.4 Vehicle Noise

Human response to noise varies, depending on the type and characteristics of the noise, distance between the noise source and the receptor, receptor sensitivity, and time of day. Transportation noise from vehicles is considered part of the military noise environment. Examples of noise levels for common Army vehicles are listed in Table 3.2.4.d.

Table 3.2.4.d Noise Levels (dBA) of Common Army Vehicles

Type	Distance[1] – 50 ft		Distance[1] – 100 ft
	Moving Maximum	Idle Maximum	Moving Maximum
Stryker	85[2]	78[3]	No data
Howitzer M109	96	76	92
D-8K Dozer	92	73	87
M548 Ammo Carrier	85	70	79
M88 Recovery Vehicle	97	70	92
M113 Personnel Carrier	87	76	82
ABLV Bridge Launcher	96	70	91
M1A1 Tank[4]	89	75	85

[1]Distance from noise source to recording device
[2]Distance is 60 ft. Source: Project Manager Brigade Combat Team 2002
[3]Distance is 20 ft. Source: Project Manager Brigade Combat Team 2002
[4]Not used in Alaska, but included for comparative purposes

Source: SAIC 2000

3.2.4.4.1 Existing Vehicle Noise

As part of transformation at USARAK, the Army will utilize a new family of light armored vehicles known as the Stryker. The Stryker is an eight-wheel-drive, hard-steel vehicle designed to greatly increase ground mobility and firepower as compared to the current light infantry brigade vehicle. The noise levels generated by Stryker vehicles would be less than (or equal to) the noise generated by other equipment used by the Army (Table 3.2.4.d). For example, the noise level of a Stryker moving at 50 mph is approximately 85 dBA at 60 ft away, compared to 89 dBA for a moving M1A2 tank (speed unspecified) at 50 ft away (USARAK 2004a).

Battalion-size and larger elements currently train at DTA throughout the year. Training exercises may include deployment of troops by truck. Some vehicle testing, including tracked and wheeled vehicles, also takes place on the DTA. Though Army vehicles tend to be louder than typical passenger cars, they are still quiet enough that noise impacts are very localized. Thus, there are minimal impacts by Army vehicles to noise-sensitive lands.

3.2.4.5 Aircraft Noise

The NOISEMAP computer model is the official Department of Defense (DoD) model for military airfield noise. Wyle Laboratories developed this program for the USAF (U.S. Air Force 1990a). The required inputs to the program are the location of the flight tracks and the number of each type of aircraft using each flight track, obtained from airfield operational data. The BASEOPS program is used to enter these data into the NOISEMAP input file. A revised Army helicopter database was added to NOISEMAP in 1993.

The NZs generated by NOISEMAP can depict areas where noise-sensitive land uses would be incompatible with aircraft operations. But, the levels of operations at DTA are not high enough to generate a NZ II or III contour that extends beyond the installation boundary. As with impulsive noise events, there still is the possibility that an infrequent helicopter overflight may cause annoyance, and possibly lead to complaints.

Scandinavian studies (Rylander et al. 1974, Rylander and Bjorkman 1988) looked at the correlation between maximum overflight noise levels and annoyance levels. The subjects in the study were exposed to between 50 and 200 aircraft overflights per day. While there is no evidence that the Scandinavian studies would be applicable to the operations at airfields (flight tracks and Nap-of-the-Earth (NOE) routes with fewer than 50 operations per day) it is a tool that can provide some indication of annoyance, defined as the percent of people who might be annoyed. Rylander found that a good predictor of annoyance at airfields is the maximum level of the three noisiest events.

The maximum noise levels (USAF 1977, USAF 1978, USAF 1990) for various U.S. military aircraft are listed in Table 3.2.4.e. These aircraft are in the current Army and Air Force aviation inventories in Alaska. These maximum levels may be compared with the levels listed in Table 3.2.4.f to determine the percent of the population that would consider itself highly annoyed from the noise levels generated by a single aircraft.

Table 3.2.4.e Maximum Noise Levels of Aircraft

Maximum Level, dBA								
	Rotary Wing			Fixed Wing				
Slant Distance (ft)[1]	**CH-47D**	**OH-58D**	**UH-60**	**A-10**	**KC-135**	**C-17**	**F-16**	**C-130**
200	98	89	91	104	99	107	111	99
500	89	81	83	65	90	97	104	90
1,000	83	74	76	87	83	89	99	83
2,000	77	67	69	78	76	79	93	75
5,000	67	56	58	65	64	66	83	63

[1]Speed at 100 Knots

Table 3.2.4.f Percentage of Population Highly Annoyed from Aircraft Noise

Maximum Level, dBA	Percentage Highly Annoyed
70	5
75	13
80	20
85	28
90	35

3.2.4.5.1 Existing Aircraft Noise

Aircraft activity takes place throughout the airspace above DTA, with the highest concentration of aircraft operations in the immediate vicinity of Allen Army Airfield. Aircraft operations include both fixed-wing and rotary-wing operations. The operational data for the airfield were modeled as part of the Environmental Noise Management Program, but because contours are based on annual average, the level of operations was not enough to generate a NZ II or III contour that extends beyond the runway.

Other existing aircraft noise is attributed to transient Air Force operations. The Air Force also flies both fixed-wing and rotary-wing aircraft. The airspace above DTA is Restricted Airspace R2202. Established Military Operation Areas (MOAs), that have fixed minimum and maximum flight altitudes, are adjacent to DTA. Both R2202 and the adjacent MOAs are frequently used by the Air Force for aircraft training exercises (Appendix, Figure 2.b). The MOAs do not include the area of Delta Junction. When aircraft are flying out of the MOAs or restricted airspace, they must follow Federal Aviation Administration (FAA) guidelines. FAA guidelines state that aircraft must maintain a minimum flight altitude of 500 ft Above Ground Level (AGL). Because of the large area that the flights are dispersed in, these operations do not generate a NZ II or III contour in the vicinity of DTA. Elmendorf Air Force Base (AFB) has information on its website that pertains to the airspace and to yearly training exercises such as Northern Edge and Cope Thunder (http://www.elmendorf.af.mil/11AF/611AOG/611AOS/webdocs/suais/suais.htm). During these Joint Force Training Exercises, there are increases in numbers of operations, especially at low altitudes.

Existing Air Force operations in these areas are not enough to generate a NZ II. For routine daily training operations, the ADNL in the immediate vicinity of the Impact Areas, those used by the Air Force at DTA, range from 60 to 63 dBA (below the 65 ADNL needed for NZ II). Two to three miles away, the sound levels decrease to 55 dBA (USARAK 2001). During a major training exercise, the ADNL may increase from 62 to 65 dBA, but it still drops to 55 dBA outside of the

immediate target areas. This drop in noise levels stems from two factors: (1) when not participating directly with the range/impact areas, the flights are too dispersed throughout the MOAs to generate a NZ in a particular location, and (2) when not directly involved in the training exercise, aircraft will loiter (fly) at higher altitudes, reducing noise levels.

Routine noise generating operations at DTA involve small arms training, artillery training and rotary-wing and fixed-wing aircraft. In addition, other minor sources of noise include construction, traffic, and recreation. Some of the noise reported on and off the Army installation is due to Air Force flights over DTA airspace. In fulfillment of AR 200-1, USARAK developed Environmental Noise Management Plan for each installation (in 2001) that assessed the noise environments and associated impacts. The current noise environment at DTA is documented in the Environmental Noise Management Plan that was prepared for Fort Greely in 2001.

DTA receives relatively few environmental noise complaints each year from the surrounding community. Most calls are from people with questions or requests for information. The few recently-logged complaints stem from noise of large-scale training activities such as Northern Edge and Cope Thunder. USARAK provides a two-week notice to the public for noise generated during late firing training operations (between 10:00 p.m. and 7:00 a.m.) by publishing notices in the local newspapers and television. Notices are intended as an additional safety measure to keep the public informed regarding those areas to avoid during training events.

3.2.4.6 Existing Noise Conditions at Eddy Drop Zone

The Eddy Drop Zone study area currently falls within NZ I, since no munitions with explosive projectiles are used at this location. USARAK uses Alabama, Arkansas, Georgia, and Lampkin ranges for small arms training, which are located just west of Eddy Drop Zone. The Eddy Drop Zone study area has been used for non-standard maneuver live-fire in the past. Routine DTA noise sources include rotary-wing aircraft, and artillery training, as well as other minor noise sources such as construction, traffic, and recreation. Aircraft from the USAF generate noise over DTA airspace.

3.2.4.7 Existing Noise Conditions at Donnelly Drop Zone

The Donnelly Drop Zone study area currently falls within NZ I, since no munitions are used at this location. Routine DTA noise sources include rotary-wing aircraft, and artillery training, as well as other minor noise sources such as construction, traffic, and recreation. Aircraft from the USAF generate noise over DTA airspace.

3.2.4.8 Existing Noise Conditions at North Texas Range

The North Texas Range study area currently includes some NZ II and III areas. Appendix, Figure 3.l (Montgomery Watson 2001) shows noise levels within the North Texas study area. Approximately 9,677 acres are classified as Zone II and 4,476 acres are classified as NZ III. None of these zones leave the installation boundaries. Routine DTA noise sources include rotary-wing aircraft, artillery training, and bomb detonation (west of the Delta River only), as well as other minor noise sources such as construction, traffic, and recreation. Aircraft from the USAF generate noise over DTA airspace.

3.2.5 HUMAN HEALTH AND SAFETY

Issue 6: Human health and safety impacts. The impact of construction and operation of the BAX and CACTF on human health and safety was identified as a primary issue of concern during scoping. Additional information can be found in Section 1.9, *Issues Identified During the Scoping Process*.

Human health and safety includes those facets of military activities and materials that potentially pose a risk to the health, safety, and well-being of both the public and military personnel and civilian employees/dependents. Risks involve hazardous materials and wastes, asbestos, radon, polychlorinated biphenyls (PCBs), solid wastes, pesticides, and lead-based paint; in addition to UXO, vehicular accidents and other occupational safety hazards posed by USARAK activities.

Based on issues raised during scoping, topics discussed in this section include traffic concerns in and around DTA, hazardous materials, contaminated sites, and UXO concerns.

3.2.5.1 Traffic

Traffic on Alaskan highways has risen steadily over the past decade. Traffic information is available from the Alaska Department of Transportation's (AKDOT) 1999-2001 statistical data (AKDOT 2002b).

Average 2001 daily traffic counts along the Richardson Highway, available only in close proximity to Fairbanks, show a sharp decline in traffic levels from Fairbanks south to Harding Lake. Average daily traffic between Fairbanks and North Pole was 15,000 vehicles, while average traffic south of Eielson AFB towards Harding Lake was 2,600 vehicles per day; translating into 5,475,000 and 949,000 annual vehicles, respectively. No vehicle counts are available for segments further south along the Richardson Highway.

Accident statistics along the Richardson Highway are available from AKDOT's 2000 statistics (AKDOT 2002). Accidents have been divided into two categories: those involving "property damage only" (PDO) or minor injuries, and accidents involving major injuries or fatalities. Between the Glenn Highway and Delta Junction, there were 22 PDO events and two major accidents. Moose were involved in seven of the accidents along this 151-mile stretch. Between Delta Junction and Eielson, there were 47 PDOs and minor accidents, and two major accidents. Moose were involved in 10 of these accidents. This stretch of the highway covers 76.9 miles. Between Eielson and Fairbanks, there were 111 PDOs and minor accidents, and five major and fatal accidents. Moose were involved in 20 of the accidents along this 17.4-mile stretch.

Overall, fewer accidents in Alaska occurred, based on vehicle miles traveled (VMT), on divided rural interstates (1.166 accidents per 100 million VMT) and undivided urban and rural interstates (1.282 accidents per 100 million VMT). These are also the roadways most likely to be impacted by "administrative road marches," involving military convoy traffic for deployment training. Currently, USARAK deployment miles are greatest between Fort Richardson (FRA) and DTA, while convoys occur most commonly between Fort Wainwright (FWA) Main Post and Yukon Training Area (YTA). Deployment miles may also include rail and air transport methods, such as airborne training flights.

AR 385-55, *Prevention of Motor Vehicle Accidents* and USARAK Regulation 55-2, *Transportation Operations and Planning in Alaska* provide detailed regulations for convoy

preparation and implementation. Additional information can be found in *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2,* Appendix H (USARAK 2004a). Army convoys are subject to an AKDOT permitting process. USARAK standard operating procedures call for large convoys to be broken into groups of no more than 20 vehicles. These groups are then separated by 30-minute gaps to alleviate traffic pressures on Alaska's highways. Highway speed for a military convoy is not expected to exceed 40 miles per hour, with the exception of "catch-up speed," listed at 45 miles per hour. Convoys are normally not authorized to travel during peak traffic hours (USARAK 2001).

Additional convoy traffic will result from USARAK transformation and the stationing of an SBCT. Deployment miles to DTA would increase from 437,600 to approximately 1,042,000 beginning in 2004 through 2009, then drop to 937,600 by 2010. Company and battalion-sized deployments to DTA would increase to 62 times per year. Overall convoy impacts are expected to be moderate (USARAK 2004a). Additional information on convoys can be obtained from the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vols. 1 and 2* (USARAK 2004a).

3.2.5.1.1 Traffic at Eddy Drop Zone, Donnelly Drop Zone and North Texas Range

USARAK currently deploys regularly from FWA to DTA for training. USARAK deploys troops 26 times per year from the FWA Main Post to DTA. This includes 24 company-sized deployments (involving 30 vehicles) and two battalion-sized deployments (involving 122 vehicles). The total annual military vehicle count between FWA Main Post and DTA is 964, or 1,928 including return (roundtrip) convoy traffic. Convoys from FRA to DTA require the use of the Glenn and Richardson highways. Convoy sizes vary, based on the unit size deploying for training, but would be similar to those traveling between FWA Main Post and DTA. Large convoys are usually segmented to reduce impacts to traffic on public roads.

3.2.5.2 Hazardous Materials and Wastes Management

Hazardous materials and waste management are managed through applicable regulatory procedures and programs that are designed to ensure proper handling of hazardous materials or wastes. Most activities that use hazardous materials or generate hazardous wastes are conducted within the cantonment areas. DTA activities do not generate normal cantonment-like waste streams because DTA is comprised of mostly maneuver and training land.

This section provides an overview of hazardous materials management, including hazardous waste management, pollution prevention initiatives, Installation Restoration Program (IRP) sites, and the use of storage tanks, asbestos, PCBs, lead-based paint, radon, and pesticides. Hazardous materials and hazardous waste management activities are governed by Federal and/or state regulations. This includes substances that may present a substantial risk to human health and the environment. Solid wastes that possess specific characteristics of toxicity, ignitability, corrosivity, or reactivity are also considered hazardous. Solid and liquid waste can be defined as any discarded materials that are not specifically excluded by 40 Code of Federal Regulations (CFR) 261.4. Transportation of hazardous materials is regulated under 49 CFR, Transportation.

AR 200-1, *Environmental Protection and Enhancement* governs all aspects of hazardous materials and regulated waste management by military or civilian personnel, on-post tenants, and contractors at all Army facilities. This pamphlet establishes the policies, responsibilities, and procedures for complying with hazardous materials/regulated waste management regulations, decision documents, and Records of Decision established by the DoD, Department of the Army,

USARAK, Environmental Protection Agency (EPA), United States Department of Transportation, and the Occupational Safety and Health Administration.

This guidance applies to all military commands and units, civilian activities, tenants, contractors, subcontractors, and consultants working at USARAK facilities, DTA. The activities covered by AR 200-1 include:

- Hazardous materials storage
- Waste minimization and pollution prevention activities
- Activities of waste generators
- Institutional controls for excavation and other land and water uses

DTA has few issues relating to human health and safety. Due to the lack of a cantonment area, housing, and potential waste-generating facilities, DTA is not considered a USARAK property having significant human health and safety issues.

Petroleum, oils, and lubricants (POL) will be used during construction and operation of the BAX and CACTF. POL distribution points and refueling operations are constructed and operated in accordance with USARAK Regulation 200-4, *Hazardous Waste, Used Oil, and Hazardous Materials Management*.

3.2.5.2.1 Hazardous Materials and Wastes Management at Eddy Drop Zone, Donnelly Drop Zone and North Texas Range

Due to the lack of a cantonment area, housing, and potential waste-generating facilities in the three study areas, hazardous materials and wastes management issues are applicable only when units are deployed to DTA. Federal, State, and DoD regulations (summarized above) cover training activities.

3.2.5.3 Contaminated Sites

USARAK administers an IRP to identify, investigate, and remediate contamination from regulated substances. The primary focus of the IRP is remediation of contaminants, such as chlorinated solvents, regulated by the Comprehensive Environmental Restoration, Compensation, and Liability Act (CERCLA) (i.e., the "Superfund" Act). In addition, USARAK investigates and remediates contaminants such as PCBs, petroleum, and asbestos. Cleanup of these contaminants is not regulated under CERCLA, but are regulated by various other Federal, state, and Army regulations.

Contaminant source areas are managed by interagency agreements designed to implement the IRP and address any stakeholder concerns. The Army, EPA, and the state of Alaska have signed Federal Facility Agreements for FWA, which includes DTA. These agreements specify the CERCLA clean-up process. In addition, Environmental Restoration Agreements between the state of Alaska and the Army were developed to outline clean-up processes at non-Superfund sites.

3.2.5.3.1 Contaminated Sites at Eddy Drop Zone, Donnelly Drop Zone and North Texas Range

There are no sites within DTA listed on the EPA's National Priorities List under CERCLA.

3.2.5.4 Unexploded Ordnance and Range Safety

UXO, or duds, refers to explosive munitions that have failed to detonate properly or completely, leaving potentially explosive munitions or hazardous materials at (or near) the point of impact. Dud munitions are a present hazard within impact area boundaries on many USARAK properties, as a variety of actions could possibly expose them to pressure, weight, heat, or human contact; causing them to detonate.

The approximate rate of munitions failure (i.e., ordnance that completely fails to detonate) is between 2.75 and 3.5%. The approximate rate of "low order detonation," or partially exploded ordnance, is between 0.25 and 0.3% (Dauphin and Doyle 2000, 2001). However, these rates may vary depending on a number of factors, such as age of the munitions being fired, variations in lot production, and ambient conditions. Snow-covered impact areas are also more likely to cause dudding than areas without snow. Given the nature of USARAK's impact areas and the frequency of winter training, it is expected that the dud rate could be somewhat higher than 3.5% (Dauphin and Doyle 2000, 2001).

Access to impact areas will be restricted to mission-essential activities and coordinated with the Range Control office before entry. Appropriate clearing of UXO will be done before entry, except under emergency situations (example, aircraft mishaps or life safety). The requesting agency assumes all responsibility and liability of personnel, and costs associated with entry into the impact zone (USARAK 2002b).

Impact areas are marked with warning signs and/or barriers. Passing any of these hazard warnings without approval is prohibited. Unauthorized entry (trespassing), as well as handling or removing UXO/munitions, are punishable offenses.

3.2.5.4.1 Unexploded Ordnance and Range Safety at Eddy Drop Zone, Donnelly Drop Zone and North Texas Range

Impact areas are posted with warning signs that indicate the potential risks of UXO on the impact area. The Eddy Drop Zone and Donnelly Drop Zone study areas are well outside the impact areas that are located within DTA West (west of the Delta River) (Appendix, Figure 2.e). The North Texas Range study area is located east of the Delta River. However, the proposed BAX SDZ at North Texas Range is located within existing impact areas located on the west side of the Delta River. While the potential for UXO exists, it is low for all three alternative BAX and CACTF footprints.

3.2.6 WILDLIFE AND FISHERIES

Issue 7: Wildlife and fisheries impacts. The impact of construction and operation of the BAX and CACTF to seasonal moose movement and migratory birds was identified as a concern during tribal consultations. Additional information can be found in Section 1.8, *Government-to-Government Consultation*.

3.2.6.1 Wildlife

Alaska's 322 million acres of public lands support a wide diversity of wildlife species (Alaska Division of Tourism 2002). Forty-three species of mammals, 173 species of birds, and one amphibian species exist on lands managed by USARAK (For a complete list, see Appendix E of

the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2* (USARAK 2004a)). In addition, DTA is home to the largest variety of game mammals, furbearers, waterfowl, and upland game birds of any military area in the country (BLM and U.S. Army 1994).

USARAK cooperatively manages wildlife and habitats with the ADF&G, and the U.S. Fish and Wildlife Service (USFWS). The Fort Greely Natural Resources Conservation Program, operated under a statewide cooperative agreement between the 172nd Infantry Brigade, USFWS and ADF&G, was originally signed in 1960 and is regularly updated. In 1986, USARAK entered into a cooperative agreement with the USFWS and ADF&G to develop fish and wildlife management programs. The current signed Integrated Natural Resource Management Plans (INRMPs) replace these agreements (USARAK 2002b), and will be renewed again in 2006.

These original cooperative agreements recognized that various species use certain areas of the DTA for calving or roosting, or as important habitat. Bison, caribou, Dall sheep, and Sandhill cranes were monitored during these crucial times to ensure minimal disturbances. The DTA INRMP (2002-2006) supersedes the original cooperative agreement; however, the Army now manages these areas as "Special Interest Management Areas." Range Regulations (USARAK Range Regulation 350-2) state that all firing will cease when animals are present on the range, regardless of season (USARAK 2004b). USARAK monitors military training throughout the year, especially during spring bird migration and bison and caribou calving, to ensure that training follows restrictions specified for the special interest management areas.

The ADF&G is responsible for managing game populations on Alaska's Army lands, and establishing population and habitat management goals. The USFWS is primarily responsible for managing nongame populations of fish and wildlife, and management of migratory bird species. USARAK works with both agencies to promote habitat management on Army lands.

The Army's specific wildlife goals include habitat improvement for game and nongame species, using nesting structures to improve productivity of birds, and maintaining sustainable harvest of game populations. In addition, USARAK manages vegetation to ensure that the age class is diversified. The natural resources program encourages Watchable Wildlife, constructing viewing platforms and nest boxes, and the program strives to integrate ecosystem management into Army planning (USARAK 2002b.c).

The ADF&G divides the state into Game Management Units (GMU), which are subdivided into subunits (Appendix, Figure 3.m). All of the Army's lands in interior Alaska are located in GMU 20. DTA East, at 93,000 acres, makes up 2.5% of GMU 20D. The Federal Subsistence Board uses the same game management units to regulate subsistence take of customary and traditional game species. Species that could be affected by the proposed BAX and CACTF are discussed below.

3.2.6.1.1 Mammals

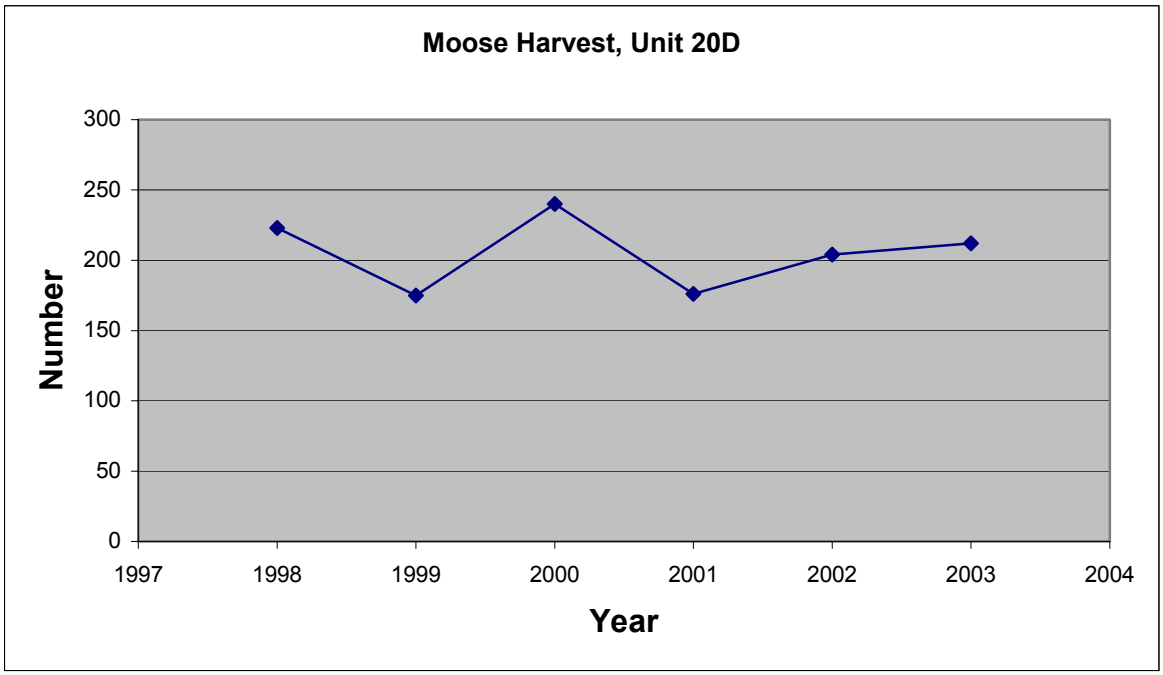
Some recent records on trapping, hunter harvest, and black bear baiting are available for DTA. Currently, only trapping and bear baiting reports are collected by USARAK. This information is used to support the Army's goal of a sustainable game species harvest. However, monitoring and habitat use indices were not collected, and the harvest data should not be considered as a population index.

Moose (*Alces alces*) are the most visible and economically important wildlife species on DTA. Hunting and wildlife viewing are popular activities. All of DTA, east of the Delta River, is

recognized as moose concentration areas (USARAK 2004a). Region-wide surveys, with USARAK support, are annually performed by ADF&G. Estimated densities are greater than four moose per square mile, and moose twinning surveys have been conducted to provide information about habitat quality (USARAK 2004a). These surveys partially form the basis for moose harvest goals within GMU 20D each year.

GMU 20D is divided by ADF&G into northern and southern portions for survey convenience. The moose population management objective within 20D is between 8,000 and 10,000 moose. Estimates indicate that about 2,400 moose (1999 data) inhabit the northern portion of 20D, and about 4,450 (2003 data) animals occupy the southern portion. The sustainable harvest quota, determined by the Alaska State Board of Game for 20D, is between 500 and 700 moose, depending on herd size. If the herd size is not at the management objective, fewer harvest permits will be issued, or, if a registration hunt applies, the hunt will close once the quota is reached. Population goals were not met from 1998 to 2003. Figure 3.n shows moose harvest numbers by year for 20D. (Additional hunting information is located in Section 3.3.8, *Public Access and Recreation*.)

Figure 3.n Annual Moose Harvest Totals for GMU 20D, 1998-2003

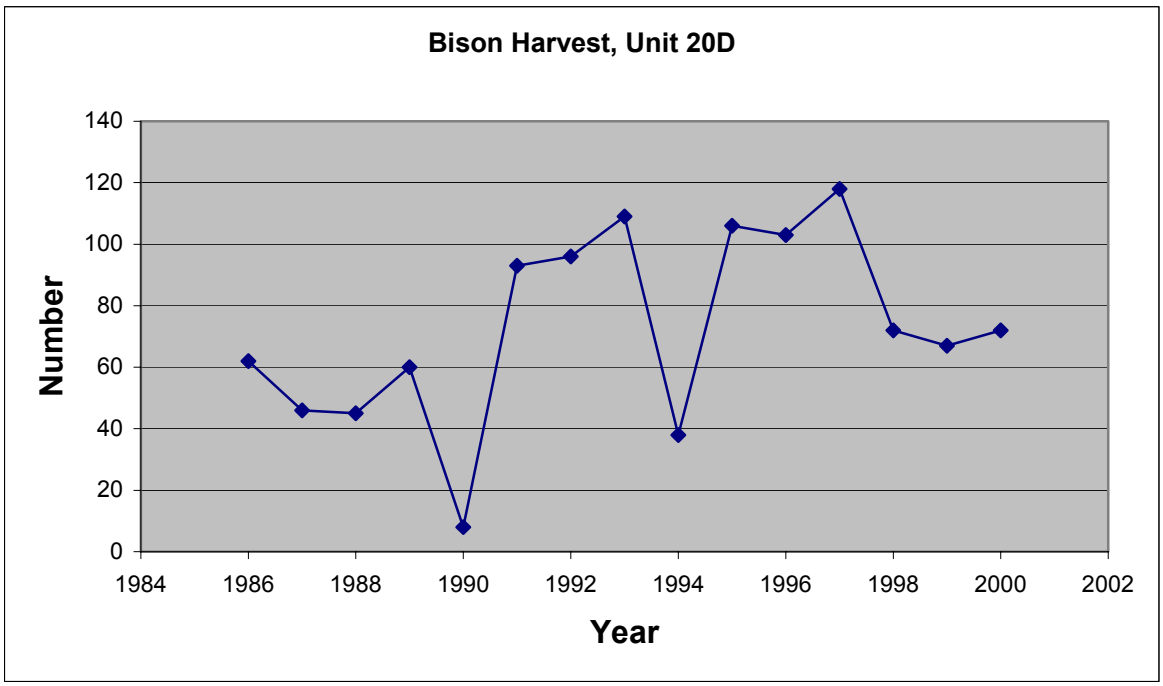


Source: DuBois 2002, DuBois 2004.

Bison (*Bison bison*) were introduced into the Big Delta-Delta Junction area in 1928 after they were eliminated from the area 450-500 years ago. DuBois and Rogers (2000) summarized the history, natural history, and management of the herd in the Delta Bison Management Plan 2000-2005. Hunting is the main mortality factor. The Delta bison calve (April through July), primarily in the Delta River floodplain, and spend the summer in surrounding uplands, including Texas and Washington Ranges. Bison usually move off DTA by late July-early August (Anonymous 1979, Kiker and Fielder 1980). A 1980 cooperative agreement designated areas on DTA West as important bison calving and summer range, and DTA East as important late summer and early winter range (Bonito 1980). A 1986 agreement with the ADF&G (U.S. Army 1986) identified bison calving and summer range (Appendix, Figure 3.o). Bison are now managed within the USARAK's Special Interest Management Area, as described in Section 3.2.6.1.

During the fall of 2003, the bison herd was estimated to have 407 animals (DuBois 2004). Currently, the Delta bison population is managed at about 430 animals during the pre-calving season. Hunting permits are allocated by drawing, and numbers of permits are based on that year's fall population. Figure 3.p shows historical harvest numbers for bison in 20D. (Additional hunting information is located in Section 3.3.8, *Public Access and Recreation*.)

Figure 3.p Annual Bison Harvest Totals for GMU 20D, 1986-2000



The ADF&G bison management plan includes maintenance of bison food plots near the Alaska Highway. This area is intended to provide forage in order to reduce the number of days bison may be in the private agricultural fields north of DTA East. USARAK initially created bison food plots along Meadows Road in the 1980s, in cooperation with ADF&G and the surrounding community.

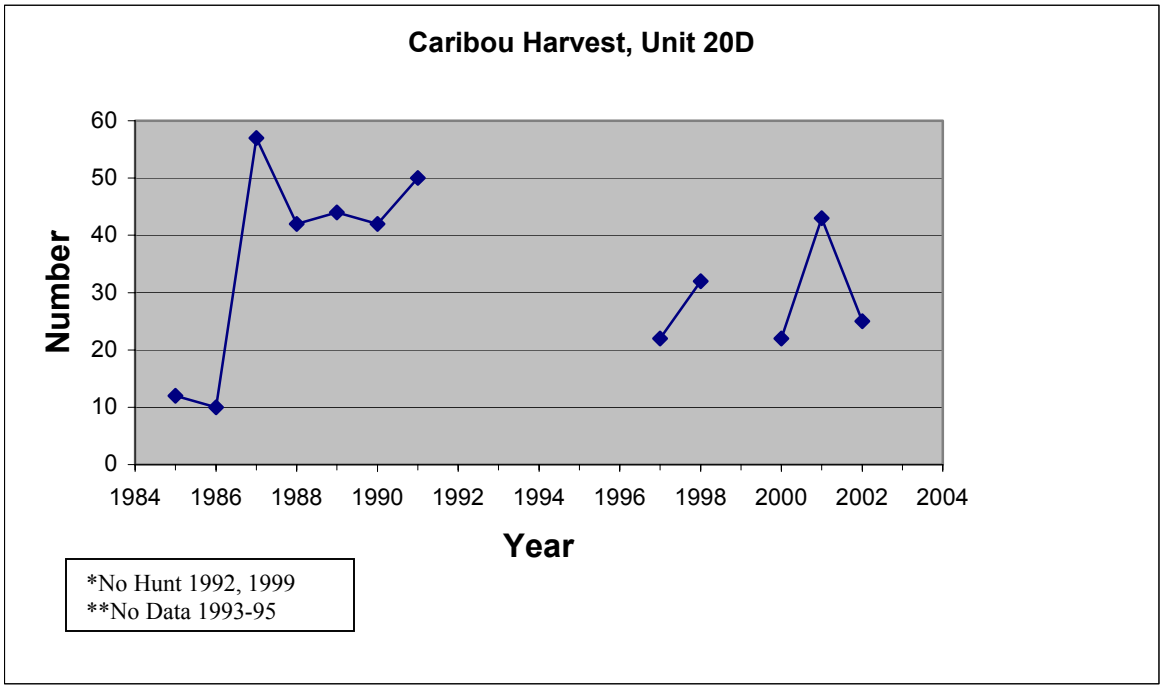
During the past 15 years, ADF&G has conducted bison surveys from June to September. Recent surveys on Texas Range have indicated that the bison split off into small groups in early May, and pregnant females move into the Delta River floodplain to calve. Bison movements have varied during calving season from year to year. During 2003, 15 groups of bison adults and calves were located as far north as the northern end of the Mississippi Impact Area, but there were no sightings in the area in 2002, and only two in 2004.

Major bison calving areas include the Washington Impact Area and the surrounding grassland/floodplain region, east and northeast of Buffalo Dome, and on the west side of the Delta River floodplain in the Minnesota Training Area. The west side of the Delta River, in the Michigan Lakes Impact Area and Buffer Zone, appears to be a springtime feeding area. The bison appear to regroup into large herds, with the newborn calves, in the Delta River floodplain during the last week of May. From there, they move into their summer feeding areas. The population of adults has remained constant over the past three calving surveys (around 300 adults). In 2002, 52 calves were counted, 2003 had 56 calves, and 62 calves were counted in the 2004 survey (Payne 2004).

Caribou (*Rangifer tarandus*) used the southern portion of DTA west for calving (USARAK 1999a), but since 2000, the majority of the Delta herd calved south and west of DTA (USARAK 2004a). The winter concentration area lies in the foothills, on the north side of the Alaska Range above 2,500 ft. Caribou also frequent the area around Donnelly Dome and open areas in the southern portion DTA East. Most of these animals appear to be part of the Macomb herd, according to ADF&G radio tracking data. However, many of the caribou that winter in this area are from the Delta herd (DuBois 2003). The Macomb herd does not calve on DTA.

DTA East is within the Unit 20D Macomb caribou registration hunt. Current population estimates (fall 2003) of the Macomb herd range between 550 and 575 animals. The harvest goal of the RC-835 registration hunt is 30 to 50 caribou per year, but quotas have been slightly lower at 25 to 30 animals per year. Usually, the hunted animals are not located on DTA East at the time of the registration hunt. Historical harvest numbers for the Macomb caribou herd are shown in Figure 3.q. (Additional hunting information is located in Section 3.3.8, *Public Access and Recreation*.)

Figure 3.q Annual Caribou Harvest Totals for GMU 20D, 1985-2002



The Delta and Macomb caribou herds have been studied extensively (Davis et al. 1985, Maier et al. 1999, Valkenburg 2002). However, prior to 2004, no surveys have concentrated on caribou use on DTA East. Starting in February 2004, USARAK personnel began a telemetry survey of DTA East and West to determine annual caribou numbers. Data collected thus far are preliminary.

Grizzly Bear (*Ursus arctos*) sightings are common on DTA. Bears occur throughout DTA, although concentration areas are generally at higher elevations. Bear densities in GMU 20D, including DTA east of the Delta River, average about 10 to 12 bears per 1,000 square miles (ADF&G 1998a). (Hunting information is located in Section 3.3.8, Public Access and Recreation.)

Furbearers – Estimates of wolf densities range from approximately 5 to 24 wolves per 100 square miles (USAF 1995). DTA typically has three or four wolf packs, although the structure, distribution, and numbers of packs in a given area are highly variable. Wolves have been incidentally observed during other surveys within DTA East.

Lynx (*Lynx canadensis*), pine marten (*Martes martes*), wolverine (*Gulo gulo*), red fox (*Vulpes vulpes*) and coyotes (*Canis latrans*) are trapped for fur. Wolverines are uncommon and wide-ranging in the region, whereas the other species are reasonably common (USAF 1995).

Small Mammals – Anderson et al. (2000) conducted a small mammal survey at DTA. Eleven species of small mammals were found in this study. The masked shrew (*Sores cinereus*), tundra vole (*Microtus oeconomus*), meadow vole (*Microtus pennsylvanicus*), and northern red-backed vole (*Clethrionomys rutilus*) were captured most frequently. In addition, small mammals were surveyed by USARAK through the LCTA program in 2002 (Mason 2002).

3.2.6.1.2 Avian Species

DTA includes a wide variety of high quality bird habitat. A recent tally identified 123 species. Another 10 to 12 species are likely, because these occur in surrounding areas, but have not been confirmed at DTA. The Delta Junction area, including DTA East, is a major flyway for spring and fall migrating birds, including trumpeter and tundra swans. An estimated two million waterfowl migrate through and near DTA during spring, and nine million return during fall (USAF 1995). The birds typically follow a path that parallels the Alaska Highway, and migrants frequent the DTA region on their way to points farther north. No spring surveys have been conducted to document actual numbers of birds using DTA as a stop over point. Numbers of migrating raptors and passerines are unknown. Economically and ecologically important species that could be affected by proposed range development are discussed below.

Sandhill Cranes (*Grus canadensis*) Approximately 300,000 Sandhill cranes, a large portion of the world's population, migrate through DTA from late-April through mid-May and again in August and September (Anderson et al. 2000). The region surrounding Delta Junction and DTA East is an important migratory stop over and is used for roosting and feeding. Observations by Anderson et al. (2000) found roosting sites in the agricultural fields around Delta Junction. No survey has been conducted by USARAK for Sandhill cranes. An incidental observation, in May 2003, by USARAK personnel identified approximately 800 cranes in the Delta River at the Wills Range Complex firing fan, west of the Fort Greely cantonment area (Payne 2004).

Sandhill crane roosting areas are managed by USARAK as a “Special Interest Management Area” (USARAK 2002b). Management of this area restricts military training when migrating cranes are present along the Delta River and Delta Creek (USARAK 2004b).

Trumpeter Swans (*Cygnus buccinator*) Trumpeter swans were thought to be extinct in 1900, but the population in Alaska has been increasing in recent years. The USFWS conducted swan surveys in Alaska at five-year intervals between 1975 and 2000 (Conant et al. 1996). Although adult and cygnet counts have fluctuated, the long-term trend indicates an increase of trumpeter swans since 1990 (Anderson et al. 2000). In addition, a 1983 survey for trumpeter swans found only eight individual swans on DTA, but a 2003 survey by USARAK personnel found 34 swans including six broods with 14 young (Mason 2003).

USARAK, in cooperation with the USFWS, conducted aerial brood productivity surveys in 2001 and 2003 at DTA. Brood productivity surveys are flown from the last two weeks of August to the

first two weeks of September. Brood Productivity Surveys cover 100% of the useable swan habitat in each U.S. Geological Survey quadrangle map. DTA East (Mt. Hayes D-4 quadrangle) does not appear to be an important brood rearing area. Between 1980 and 1990, no swans were counted in DTA East during the brood survey. In 1995 and 2000, a single bird was observed on Big Lake (Groves 2004).

DTA is not considered prime nesting and brood rearing habitat, compared to other areas in interior Alaska, such as the Tanana Flats Training Area. The most important nesting and brood rearing areas at DTA are the Lakes Impact Area, starting on the west bank of the Delta River and extending west and north to Delta Creek.

Sharp-tailed Grouse (*Tympanuchus phasianellus*) This species is the most popularly sought game bird in the Delta Junction area. Although sharp-tailed grouse are common, very little is known about their ecology in this region (the northwest extent of their range). DTA has been identified as an important area for sharp-tailed grouse, and is especially important as winter range (Raymond 2001). Sharp-tailed grouse use open, brushy habitats across DTA, including recent burns and human disturbed areas.

Passerines – Fifty-five species of passerine birds have been identified on DTA by USARAK natural resources personnel and contracted bird survey scientists. This includes fourteen species identified by Federal, state and regional agencies as "species of concern." Reasons for concern vary, but are most often due to documented population declines (see Section 3.3.5, *Threatened or Endangered Species and Species of Concern*). Bird surveys and monitoring projects are ongoing on DTA, in an effort to better understand population trends and habitat requirements of passerine birds, to aid in management efforts and land use decisions.

Raptors – Estimates from migration surveys indicate that approximately 25,000 raptors migrate through DTA during spring and 48,000 during fall (USAF 1995). Sixteen species of diurnal and nocturnal raptors have been identified on DTA by USARAK natural resources personnel and contracted bird survey scientists. A raptor survey of DTA found several golden eagle (*Aquila chrysaetos*) nests in the southwest portion of the post, and identified potential nesting habitat for gyrfalcons (*Falco rusticolus*) and peregrine falcons (*Falco peregrinus*) (Anderson et al. 2000). Several other common species are known to nest on post, including red-tailed hawks (*Buteo jamaicensis*) and great-horned owls (*Bubo virginianus*). Northern goshawks (*Accipter gentilis*) nest on post, and are most common during years when the snowshoe hare population is high. Bald eagles (*Haliaeetus leucocephalus*) have been seen along Meadows Road, but nests have not been found (Reidsma 2004).

Other birds – The lakes and ponds on DTA host a large variety of nesting waterfowl, the most common being the American wigeon (*Anas Americana*) and common goldeneye (*Bucephala clangula*). Shorebirds are not abundant on post, even during migration, with the exception of upland sandpipers (*Bartramia longicauda*), which nest in a wide variety of habitats and locations on post. Willow ptarmigan (*Lagopus lagopus*), ruffed grouse (*Bonasa umbellus*) and spruce grouse (*Dendragapus canadensis*) are common in appropriate habitat, and are popular game birds.

3.2.6.1.3 Reptiles and Amphibians

Wood frogs (*Rana sylvatica*) are the only amphibians in the Alaska Interior, and they are found on DTA. There are no reptiles.

3.2.6.1.4 Special Status Fauna

The Appendix contains a copy of a letter from the USFWS confirming that no Federally listed species reside or breed on Army lands in Alaska, and that consultation under Section 7(a)(2) of the Endangered Species Act, 16 USC 1536(a)(2) is not required. Although the American peregrine falcon was delisted as an endangered species in 1999, the USFWS requests consultation on any projects that may hinder their recovery. The installation is within their breeding range, but their actual presence is unknown. They are known to nest within a few miles of the northwestern corner of the DTA East (Ritchie and Rose 1998). Proposed activities will have no effect on the recovery of the peregrine falcon in this area.

The USFWS updates a list of Birds of Conservation Concern by Bird Conservation Regions (BCR) every five years. Birds on the BCR 4 list that also occur on DTA include the peregrine falcon, American golden-plover, whimbrel, and surfbird.

Boreal Partners in Flight has identified priority bird species for conservation in Alaska (Boreal Partners in Flight Working Group 1999). The rankings are based on conservation vulnerability. This listing includes the gyrfalcon, sharp-tailed grouse, great gray owl, boreal owl, black-backed woodpecker, Hammond's flycatcher, American dipper, varied thrush, bohemian waxwing, rusty blackbird, and white-winged crossbill (Andres 2001) (see Section 3.3.5, *Threatened or Endangered Species and Species of Concern*).

3.2.6.1.5 Wildlife at Eddy Drop Zone Study Area

3.2.6.1.5.1 Mammals

Moose are the most visible and economically important mammal at the Eddy Drop Zone study area. ADF&G estimates moose densities in the area at four moose per square mile. Most of the proposed BAX and CACTF site is within the Delta Junction Management Area (DJMA), and moose hunting is limited to 10 special permit holders (Appendix, Figure 3.m). However, the southeast corner of the proposed BAX location is not in the DJMA and is part of a popular moose hunting area on post that is used by the general public. That area is also high quality moose habitat, developed from a fire in 1987. Moose generally move freely throughout the study area as no existing structures or fences exist that would impede movement.

Bison change their migration patterns depending on habitat and food availability. The Delta herd has recently been migrating between winter areas (agricultural fields north of DTA East) and summer areas (Delta River and Texas uplands). This route is further south (near Donnelly Drop Zone) than in the past, when they used to follow a route near Allen Army Airfield. Bison are not currently using the Eddy Drop Zone study area in large numbers.

Caribou and wolverines are rare at Eddy Drop Zone study area, and it does not contain their preferred habitat. Grizzly bears, black bears, and wolves are uncommon. Only only a few animals throughout the year use Eddy Drop Zone. Other furbearers are reasonably common, and include lynx, fox, coyote and marten. Common small mammals include the northern red-backed vole and meadow vole (Mason 2003).

Habitat management projects in the Eddy Drop Zone study area have consisted primarily of Drop Zone maintenance and the creation of emergency firebreaks. A moose habitat improvement project was undertaken in the 1980s, just to the east of the proposed BAX and CACTF area (Reidsma 2004). It consisted of 16 strips cut within the spruce forest, each measuring

approximately 50 by 900 ft. In the spring of 2003, five twenty-acre moose habitat clearings were created east of the site. Additional future moose habitat improvement projects are planned to create a mosaic of different-aged stands. According to Crichton (1998), 62% of species in the boreal forest of Canada benefit from such clearings. The proposed BAX and CACTF location would be evaluated as potential wildlife habitat, and future habitat work would be conducted within the range complex, or concentrated elsewhere on DTA.

3.2.6.1.5.2 Avian Species

The Eddy Drop Zone (a cleared area within the study area) is important as a breeding area and winter range for sharp-tailed grouse. Sandhill cranes also use Eddy Drop Zone to feed on blueberries in August and September. Cranes occasionally roost in the Drop Zone, or in small open wetlands within the proposed study area. No swans have been observed east of the Richardson Highway in the lake complex near Eddy Drop Zone during USARAK brood productivity surveys (Payne 2004). Habitats in the Eddy Drop Zone study area also support a wide variety of passerine birds. Documented species of concern in this area include northern goshawk, blackpoll warbler, bohemian waxwing and white-winged crossbill, but densities of these species are unknown. Migrating waterfowl use the kettle lakes at the eastern and southern edges of the study area during fall migration. Population estimates and timing of migration are unknown.

3.2.6.1.5.3 Reptiles and Amphibians

Wood frogs are likely present at Eddy Drop Zone study area, but distribution and densities are unknown.

3.2.6.1.5.4 Special Status Fauna

The southern half of the Eddy Drop Zone study area is within the USARAK's bison "Special Interest Management Area." The study area does not include any other "Special Interest Management Areas."

3.2.6.1.6 Wildlife at Donnelly Drop Zone Study Area

3.2.6.1.6.1 Mammals

Moose and caribou are the most visible and economically important mammals that use the Donnelly Drop Zone study area. The area is popular for moose hunting, as it falls just outside the DJMA. Access to caribou and Dall sheep hunting in the Granite Mountains occurs using 12-Mile Crossing and the 33-Mile Loop Road system.

Bison sometimes migrate through the northern portion of the Donnelly Drop Zone study area, in early spring and late summer, on their way to and from the Delta River and surrounding uplands (Appendix, Figure 3.o). Incidental observations, made by USARAK personnel during caribou surveys in March, have noted bison movements from the Jarvis Creek region across the Donnelly Drop Zone, and into Texas Range (Payne 2004). ADF&G observations corroborate that bison move across Donnelly Drop Zone and into the Texas Range prior to the calving season.

The Donnelly Drop Zone study area is within the overlapping range of the Macomb and Delta caribou herd. Preliminary observations indicate that some Delta Herd animals use the Donnelly Drop Zone area, the Jarvis/Macomb plateau to the south, and an area along the Richardson

Highway north of Donnelly Drop Zone. To date, all observations of Macomb herd animals have been east of the DTA East boundary. In recent years, USARAK personnel have observed small groups of caribou west of the Delta River, in the Michigan Lakes Impact Area and Buffer Zone, and east of the Delta River, near Texas Range in 2003 (Payne 2004).

Wolves and grizzly bears are uncommon at this site, yet they probably use the area (USARAK 2004a). Wolverines are wide ranging and occur in very low numbers. Coyotes are common, especially during years of high snowshoe hare (*Lepus americanus*) numbers. A recent small mammal survey found especially high numbers of northern red-backed voles (Mason 2004).

There have been no habitat management projects in the Donnelly Drop Zone study area. The proposed BAX and CACTF location would be evaluated as potential wildlife habitat, and future habitat work would be conducted within the range complex, or concentrated elsewhere on DTA.

3.2.6.1.6.2 Avian Species

The Donnelly Drop Zone study area is located in an area of high quality sharp-tailed grouse habitat. Sharp-tailed grouse are found in shrub habitats and regenerating burns in this area. Other species of concern have been documented, and include the bohemian waxwing, white-winged crossbill and olive-sided flycatcher. This area is also within the territory of a golden eagle nest on Donnelly Dome that is active irregularly. Breeding bird surveys in the area have documented dozens of other bird species, with white-crowned sparrows (*Zonotrichia leucophrys*) and fox sparrows (*Passerella iliaca*) being especially abundant. Butch Lake, in the northwest corner of the study area, is likely important for migrating waterfowl.

3.2.6.1.6.3 Reptiles and Amphibians

Wood frogs likely occur in the vicinity of Butch Lake in the Donnelly Drop Zone study area. Although they have not been confirmed in this area, the habitat is suitable, and wood frogs are relatively common in similar habitat in other areas of DTA, including Ober and Jarvis creeks.

3.2.6.1.6.4 Special Status Fauna

Bison and caribou are not known to calve in the Donnelly Drop Zone study area. The Donnelly Drop Zone study area does not include any USARAK “Special Interest Management Areas.”

3.2.6.1.7 Wildlife at North Texas Range Study Area

3.2.6.1.7.1 Mammals

Economically, bison are the most important big game animal in North Texas Range, and the range is located within the bison “Special Interest Management Area.” During late winter and spring, bison migrate from the Delta Agricultural Project to the North Texas Range/Big Lake area, where they stay until late August (Appendix, Figure 3.o). The Delta River floodplain is also important summer range. Recent surveys have documented that most calving occurs on the Delta River floodplain (Mason 2004). Major bison calving areas include the Washington Impact Area and the grassland/floodplain region east and northeast of Buffalo Dome, on the west side of the Delta River floodplain in the Minnesota Training Area.

Texas Range is an important feeding area for the bison herd after May, and more than 100 bison have been observed there during June (DuBois 2004). The Texas Range is also on the bison

migration path prior to the calving season. Incidental observations during March caribou surveys have noted bison movements from the Jarvis Creek region, across the Donnelly Drop Zone, and into Texas Range. Additional survey flights observed movement of bison across Donnelly Drop Zone and into the Texas Range, prior to the calving season (Payne 2004).

Meadows Road is a popular bison viewing area in the summer. Bison feed at forage plots and use nearby saltblocks. ADF&G also uses the area to capture and radio-collar bison for monitoring. Bison hunters occasionally hunt on the North Texas Range study area. The area is important for bison management because crop depredation can be high if bison move to the Delta Agricultural Project before the grains are harvested in August or September.

The North Texas Range study area, popular for moose viewing, is also important moose habitat. ADF&G estimates moose densities in the area at four moose per square mile (USARAK 2004a). This area is within the DJMA, and hunting is restricted to 10 permit holders. The majority of moose harvested on the DJMA come from DTA, especially areas between Donnelly Dome and Big Lake (DuBois 2003).

The North Texas Range study area is used by grizzly bears, but bears den at higher elevations to the south. Caribou are uncommon in the area and wolverines are rare. Wolves are common and are frequently observed. Coyotes are common, especially during years of high snowshoe hare numbers, which this area is known for. A recent small mammal survey found high densities of northern red-backed voles (Mason 2004).

Seven bison food plots are within the proposed BAX and CACTF footprint. In 1999, six of the plots were rehabilitated by cutting woody vegetation, re-seeding and fertilizing; and, in 2003, all seven plots were fertilized.

In 1999, five plots (17 acres) were cleared for moose habitat within the North Texas Range study area. Three of the plots would be within the proposed BAX and CACTF area, and two are immediately to the north. The proposed BAX and CACTF location would be evaluated as wildlife habitat, and future habitat work would be conducted within the range complex, or concentrated elsewhere on DTA.

3.2.6.1.7.2 Avian Species

A wide variety of birds occur in the North Texas Range study area. Sandhill cranes roost on the nearby Delta River during migration (Appendix, Figure 3.r). This portion of the Delta River has been identified as a Sandhill crane "Special Interest Management Area." Trumpeter swans are often seen on Big Lake, especially during migration. In 2003, the first pair of known nesting swans on DTA East were located just outside the proposed BAX footprint area using lakes within the study area. A single swan was observed at Big Lake in the Bolio Training Area. During the 2004 bison surveys, conducted in May, USARAK personnel incidentally observed a nesting pair of swans near the same lake on Texas Range that had the successful 2003 brood. A 2005 brood productivity survey is tentatively planned for the DTA area (Payne 2004).

The North Texas Range study area includes important breeding winter concentration areas for sharp-tailed grouse. Grouse hunting is popular at this location. A golden eagle nest on Donnelly Dome is near the study area. Waterfowl are common and the USARAK Conservation program maintains duck nest boxes (goldeneyes and buffleheads are targeted) on three lakes within the study area. In 2003, there were several sightings of one (or more) great gray owls, and a nesting

pair was believed in the North Texas Range study area. Other confirmed species of concern include the northern goshawk and common loon.

3.2.6.1.7.3 Reptiles and Amphibians

Recent wood frog surveys by USARAK have documented high numbers of wood frogs in lakes and wetlands within the North Texas Range study area.

3.2.6.1.7.4 Special Status Fauna

DTA has areas with special natural features that harbor sensitive or unique wildlife species, or represent unique plant communities (USARAK 2002b). The North Texas Range study area contains portions of the bison "Special Interest Management Area" and the Sandhill crane "Special Interest Management Area."

3.2.6.2 Fisheries

Fisheries management on USARAK lands has traditionally supported recreational fishing, maintenance of fish populations, and preservation of biological diversity. The fisheries populations and their habitats are managed cooperatively by USARAK, ADF&G, and the USFWS. Management includes the development of population and habitat management plans, as well as inventorying and monitoring fish populations and habitats. Indicator species, such as salmon, are monitored closely.

ADF&G produces a "Statewide Stocking Plan for Recreational Fisheries" each year, establishing objectives and stocking plans for the subsequent five years (ADF&G 2002). The stocking plans are subject to revision. For example, stocking of rainbow trout fingerlings has been reduced in recent years, as fewer fish are now being raised in the Anchorage fish hatchery, and stocking schedules have been altered to increase efficiency of the stocking operation (ADF&G 2002b). USARAK fisheries resources in interior Alaska, including all DTA lakes, are managed within the Region III Tanana River drainage plans. Stocking programs are funded through the Federal Aid to Sport Fish Restoration program (from Dingle-Johnson/Wallop-Breaux funds), which incorporates input from the general public and state and Federal agency biologists into specific program plans.

Species that could be affected by the proposed BAX and CACTF at DTA are discussed below.

3.2.6.2.1 Fish Stocking

Sixteen lakes on DTA, ranging from three to 320 acres, are stocked by ADF&G (Appendix, Figure 3.s). (For a complete list, see Appendix E of the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2*). With the exception of J Lake and Nickel Lake, these lakes are listed as Category 1 (completely landlocked lakes, where fish cannot escape and interact with wild fish populations). J Lake and Nickel Lake are Category 2 lakes that have an intermittent outlet, which may overflow with snowmelt during some years, thus allowing some fish to escape. USARAK constructed a rock gabion on J Lake to prevent encroachment by northern longnose suckers.

Koole Lake, the largest (320 acres) stocked lake on post, is managed under the Upper Tanana Valley Remote Lakes Sport Fishery Enhancement Plan. Stocking on the other 15 lakes is managed under the Upper Tanana Valley Rural Lakes Fishery Enhancement Plan.

Recent stocking plans on DTA lakes include the following five fish species (ADF&G 2002):

- **Rainbow Trout** – Bolio, Bullwinkle Chet, Doc, Ghost, Koole, Mark, Nickel, No Mercy, North Twin, Rockhound, South Twin, and Weasel lakes
- **Arctic Char** – Chet, Ghost, J, Mark, Nickel, and Sheefish lakes
- **Grayling** – Bolio, J, Luke, and Nickel lakes
- **Coho Salmon** – J and Mark Lake
- **Chinook Salmon** – Sheefish Lake (year 2000 only)

Lake trout are no longer a part of the stocking plan at DTA, but they may still be present in Chet, Ghost, Nickel, and North Twin lakes.

Angler use varies between 1,200 to 1,500 people per year on the 15 stocked lakes that are readily accessible from the Richardson Highway (Reidsma 2002). Koole Lake is west of the Delta River and is inaccessible by road (USARAK 1999a).

3.2.6.2.2 Wild Fisheries

Major streams on DTA are generally silt laden and do not support fisheries. Jarvis Creek flows through DTA East and the Delta River flows along the western boundary of DTA East. These waters are glacially fed, and flow from the north side of the Alaska Range to the Tanana River. Downstream of DTA, the Tanana River provides year-round habitat for some species, overwintering habitat for others, and supports migratory species. The mouth of the Delta River is important to chum salmon (*Oncorhynchus keta*). Grayling (*Thymallus arcticus*) migrate through these glacial streams to clear tributaries to spawn, and a few clear streams on DTA provide summer habitat for grayling (Parker 2004). Naturally occurring populations of lake chub (*Couesius plumbeus*), northern pike (*Esox lucius*), sculpin (*Cottus cognatus*), and the northern longnose sucker (*Catostomus catostomus*) are found in lakes at DTA (BLM and U.S. Army 1994a).

3.2.6.2.3 Fisheries at Eddy Drop Zone Study Area

Jarvis Creek borders the Eddy Drop Zone study area. These waters are glacially fed, and flow from the north side of the Alaska Range to the Tanana River. Grayling migrate through Jarvis Creek to clear tributaries to spawn (Parker 2004), although these tributaries are not within the boundary of the Eddy Drop Zone study area. There are 23 lakes within the study area, plus 10 dried lake beds. In addition, there are intermittent streams and shallow ponds in the proposed BAX and CACTF site within the Eddy Drop Zone study area. None of them support fish.

3.2.6.2.4 Fisheries at Donnelly Drop Zone Study Area

Jarvis Creek, as well as two intermittent streams, cross the Donnelly Drop Zone study area. Jarvis Creek is an important migration route for grayling moving between summer habitat in mountain streams, to the south, and winter habitat, lower in the drainage. Grayling have been seen in the clear tributaries that run through the Donnelly Drop Zone study area (Mason 2004). In addition to Butch Lake, only a few small lakes (smaller than two acres) are located on the far eastern edge of the study area. These smaller lakes are not stocked, and it is unknown what species they may contain.

3.2.6.2.5 Fisheries at North Texas Range Study Area

The multiple kettle lakes (in and around the North Texas Range study area) support important local fisheries. Sport fishing is very popular in many of the stocked lakes in this area. Fourteen stocked lakes on DTA are along Meadows and Windy Ridge roads. Big Lake is used by ADF&G as a rearing nursery for rainbow trout (*Oncorhynchus mykiss*), as it is too shallow for stocking. No streams supporting fisheries or migrating fish flow through the study area.

3.2.7 CULTURAL RESOURCES

Issue 8: Cultural resources impacts. The impact of construction and operation of the BAX and CACTF to cultural, historical, and grave sites was identified as a concern during tribal consultations. Additional information can be found in Section 1.8, *Government-to-Government Consultation*.

Historic properties include sites, buildings, districts, structures and objects dating to the prehistoric and historic periods that are found (or are likely to be found), and that are determined eligible for listing by the National Historic Preservation Act (NHPA) of 1966 (as amended). These are collectively referred to as cultural resources. This EIS evaluates impacts on historic properties under the NHPA, cultural items under the Native American Graves Protection and Repatriation Act (NAGPRA), archaeological resources under the Archaeological Resources Protection Act (ARPA), and sacred sites under Executive Order 13007, *Indian Sacred Sites*.

Archaeological resources are related to the systematic study of life, conditions, and culture of a region's predecessors, and generally focus upon material evidence found primarily in surface and/or subsurface contexts. Cultural resources under the stewardship of USARAK consist of the material manifestations of the knowledge, beliefs, art, morals, laws, and customs particular to a people or society. Cultural resources may also be traditional cultural properties or sacred sites that have significance in present Native cultures. North American archaeology has traditionally been subdivided into prehistoric and historic periods. Cultural resources are also divided according to two broad, temporal categories: prehistory and history.

Management of historic properties on Federal lands depends on their eligibility for inclusion in the National Register of Historic Places (NRHP). The NRHP classifies cultural resources in terms of five major categories:

District - A district is a geographically definable area that possesses a concentration or continuity of buildings, structures, or objects united by past events, or design, or physical development. It may contain individual elements, separated geographically, but linked by association or history. A district classification is typically used when structures of an area do not all contribute to the cultural significance of the property.

Site - Sites are locations of significant events, prehistoric or historic occupations or activities, buildings or structures, whether standing, ruined, or vanished, where the location possesses historic or prehistoric value. A site may also hold significance related to traditional cultural values when it can be associated with a real property.

Building - A building is a structure erected to shelter any form of human activity, such as a house, church, barn, or similar structure. A building may also connote a historically related

complex of buildings, such as a farmstead or an industrial complex, if all structures contribute to the significance of the property.

Structure - A structure is an engineering project that aids man's activities. It includes all standing structures not made for shelter.

Object - An object is a thing of functional, aesthetic, cultural, historical or scientific value that may be, by nature or design, movable yet associated with a specific setting or environment.

Although cultural resources in all five NRHP categories potentially exist on DTA, only one district is eligible for management under NHPA.

3.2.7.1 Prehistory

Prehistory refers to the time period before written records were available. Alaskan prehistory varies by region, due to natural conditions that enhanced or limited human occupation. The extent of glacial coverage, and the rate and directions of glacial retreat, largely influenced the ability of each region to support prolonged human occupancy and activity. Interior Alaska was probably inhabited at least 13,000 years ago, and the coastal regions were probably inhabited later.

Alaska's earliest inhabitants were nomadic hunters traveling in small bands. They arrived in interior Alaska at least 13,000 years ago, beginning a habitation that persisted through the arrival of European traders in the late 1810s. The region's ice-free, steppe-tundra environment during the Wisconsin Ice Age set the stage for this long habitation period (Péwé 1975).

The nomadic lifestyle of Alaska's earliest inhabitants, the organic nature of the materials they manufactured and used, and changed environmental conditions have made it difficult to find evidence of their cultures. Evidence is generally limited to lithic (stone) artifacts such as projectile points, cutting tools, scrapers, waste flakes from the manufacturing of these tools, and hearths. Archaeologists generally divide interior Alaska's prehistory into three broad archaeological themes according to the tools and tool-making technology of the three prehistoric groups that inhabited the region at various times. These are the Paleoarctic Tradition (12,000 to 8,000 years ago), the Northern Archaic Tradition (6,500 to 1,000 years ago), and the Athabascan Tradition (2,500 to 150 years ago) (Table 3.2.7.a).

Table 3.2.7.a Summary of Interior Alaskan Prehistory

Era	Dates	Description
Paleoarctic Tradition	12,000 – 8,000 Before Present (BP)	Early inhabitants camped on terraces and bluffs above treeless steppes, hunted large mammals such as bison and mammoth; tools fashioned from stone, bone, antler, and ivory; artifacts include microblades and microblade cores
Northern Archaic Tradition	6,500 - 1,000 BP	Adaptations due to boreal forest expansion, such as side-notched projectile points; tools include bifacial knives, microblades, end scrapers, and side-notched points
Athabascan Tradition	2,500 - 150 BP	Varied settlement patterns, often nomadic culture, subsisting primarily on terrestrial animals; subgroups exhibit distinct cultural characteristics

3.2.7.1.1 Prehistory of Eddy Drop Zone, Donnelly Drop Zone, and North Texas Range Study Areas

Paleoarctic Tradition (12,000 to 8,000 years ago) - The Paleoarctic Tradition represents the earliest human group known to inhabit Alaska. More information on this period can be found in Appendix E of the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2*. Archaeological sites containing prehistoric material have been found on DTA. None contain datable material that can assign them to any specific time period.

Northern Archaic Tradition (6,500 to 1,000 years ago) - The Northern Archaic Tradition appeared about 6,000 years ago as an adaptation to the then-forested environment of Interior Alaska and may have persisted until about 1,000 years ago. More information on this tradition may be found in Appendix E of the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2*. Archaeological sites containing prehistoric material have been found. None contain datable material that can assign them to any specific time period.

Athabascan Tradition (2,500 to 150 years ago) - Athabascans are generally divided linguistically and geographically into subgroups that inhabit or have inhabited interior Alaska and Canada. More information on this tradition can be found in Appendix E of the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2*. Archaeological sites containing prehistoric material have been found. None contain datable material that can assign them to any specific time period.

3.2.7.2 History

Historic designates that period following the introduction and use of written documents as a form of communication and preservation of knowledge, from which textural resources may also survive. The timing of the transition from prehistoric to historic varies from region to region. In interior Alaska, the historic period begins in the 1860s, when traders began entering the area. In south-central Alaska, the historic period probably began in the late 1700s.

The history of interior Alaska can be divided into four historic themes according to various kinds and levels of Euro-American activities. These are Early Contact (1810s-1880s), The Gold Rush (1880s-1928), Development of Infrastructure (1890s-1910s), and Military Activities (1890s-Present) (Table 3.2.7.b).

Table 3.2.7.b Summary of History of Interior Alaska

Era	Dates	Description
Early Contact	1810 - 1880s	Contact between aboriginal groups and Russians or English, probably at trading posts
Gold Rush	1880 - 1928	Period of influx of Euro-american settlement in interior Alaska in response to multiple gold discoveries
Development of Infrastructure	1890 - 1910	Establishment of roads and railway connecting interior Alaska with other areas
Military Activities	1890 - present	Increased military presence in interior, beginning with establishment of Ladd Field

3.2.7.2.1 History of Eddy Drop Zone, Donnelly Drop Zone, and North Texas Range Study Areas

Early Contact (1810s to 1880s) - First contact between the Athabascan and European cultures probably commenced with trade goods from Russian fur trading posts at Taral, on the Copper River, and Nulato, on the Yukon River (Hanable 1982), and a British trading post established where the Porcupine River joins the Yukon River in 1847. More information on this period can be found in Appendix E of the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2*. No village sites associated with the early contact period have been reported near DTA.

The Gold Rush (1880s to 1928) - Gold discoveries in 1886 and 1894 northeast of Fairbanks led to an influx of Anglo-American settlements in the Tanana Valley (Appendix E of the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2*). Further gold discoveries in 1902 and 1903, in the immediate vicinity of Fairbanks, led to a dramatic increase in the town's population, to 15,000 in 1909 (Naske and Rowinski 1981). Only one site associated with early mining has been found on DTA. This is the Ptarmigan Creek mining complex in DTA West. It has been determined ineligible for inclusion in the NRHP (Neely 2001).

Development of Infrastructure (1890s to 1910s) - The initial means of transport to interior Alaska was by riverboat along the Yukon River to the Tanana River, either upstream from St. Michael or downstream from Whitehorse, in Canada. An overland trail was established in 1899, from Valdez to Eagle, and later to Fairbanks. The original Valdez/Fairbanks Trail crosses DTA East, following either just parallel to or along the present Richardson Highway right-of-way (Neely 2002). A winter trail, associated with the Valdez/Fairbanks Trail, crosses DTA West, from Donnelly Dome, in the southeast corner of the training lands, to Washburn, along the Tanana River beyond the northwest corner. Properties associated with these two trails have not been evaluated for eligibility to the NRHP.

Military Activities (1928 to 1954) - Military aviation activities began in the Fairbanks area in 1913 (Cloe and Monaghan 1984). The town became the aviation hub for interior Alaska by 1928 (Cashen 1971; Robe 1970). 1935 and 1937 Federal legislation established Ladd Airfield near Fairbanks, which became the home of the Cold Weather Detachment in 1940 (Cloe and Monaghan 1984).

Ladd Field was affected by World War II, following Japan's invasion of the Aleutian Islands in 1942. The facilities at Ladd Field expanded rapidly due to increased activities of the Sixth Air Depot Group, the Cold Weather Test Station, and the Air Transport Command.

Ladd Field also served as the North American terminus of the Alaska-Siberia Lend-Lease program route, where Soviet pilots received U.S. aircraft and training before flying them to Siberia. As part of the Lend-Lease program, the Delta Field was established as an emergency landing field. In 1954, with the decommissioning of Fort Greely on Kodiak Island, the Delta Field was renamed Fort Greely. It has exceptional importance under the Cold War context for the role it played in the cold weather testing of military materiel.

3.2.7.3 Traditional Cultural Properties

Properties of traditional and religious importance, relating to Alaska Native villages may be determined eligible for listing in the NRHP. Such sites may also be considered sacred sites and are generally referred to as traditional cultural properties (TCPs). TCPs are expected to closely

relate to traditional subsistence, cultural, and religious practices on lands managed by USARAK. Traditionally, natural resources and subsistence activities associated with those resources are intertwined with cultural beliefs and practices.

Ethnographically, the Tanana River valley is home for the Tanana Athapaskan (McKennan 1981). The three cultural units of the Upper Tanana, the Tanacross, and the Lower Tanana compose the Tanana Athapaskan. A number of bands make up each unit. The Upper Tanana consisted of the Upper Chisana-Upper Nabesna band, the Scottie Creek band, the Lower Nabesna Band and the Tetlin-Last Tetlin band. Tanacross unit consisted of the Mansfield-Ketchumstuk band and the Healy Lake-Joseph band. The Salcha band, Goodpaster/Big Delta band, Wood River band, Chena band, Nenana-Toklat band and the Minto band made up the Lower Tanana unit (Simone 1982, Andrews 1975).

DTA spans the Lower Tanana and Tanacross units. Specific bands of the Lower Tanana that used DTA are the Salcha and Goodpaster/Big Delta bands (Andrews 1975). The Goodpaster/Big Delta band used areas west of the Delta River. The Salcha band used the Little Delta River drainage area. The Healy Lake-Joseph band used areas east of the Delta River. Precise territorial boundaries between the bands are extremely hard to establish. Communal hunting, trade, and intermarriages brought bands together (McKennan 1981), not only among interior bands, but also to relationships with Ahtna south of the Alaska Range. Distribution of resources also took place through a series of potlatches where guests included most of the northern Ahtna Copper River villages (Guedon 1981). Access to DTA was not limited to the Lower Tanana and Tanacross, but extended south of the Alaska Range among Ahtna bands, as well as north to the Yukon River.

Trade also formed an important means of obtaining natural resources that were not available in various regions. Tribes from the coast actively traded for natural resources with those in the interior. The Delta River, and its associated pass through the Alaska Range, provided a major artery for trade between these coastal and interior groups. Obsidian artifacts, found at DTA archaeological sites and other interior sites, indicate such a trade network existing for the past 8,000 to 10,000 years.

There is a division in subsistence focus at the Goodpaster River. To the west of the Goodpaster River, the Salcha and Goodpaster/Big Delta bands focused on salmon. The condition of the salmon beyond the Goodpaster River (to the east) becomes unfit for human consumption. East of this river, economic life of the Tanacross and Upper Tanana centered on caribou (Simone 1982 and McKennan 1981).

The Athapaskan exploited a fairly large territory and utilized different sites in their seasonal round. Those groups that focused on salmon for subsistence tended to have a settlement pattern with a centrally placed semi-permanent village in the lowlands, near the mouths of clearwater rivers and creeks. From these, they would travel to outlying areas during specific seasons for subsistence purposes (Shinkwin et al. 1980). The Upper Tanana bands, with their subsistence focus on caribou, had winter villages located in the uplands (Simone, 1982, McKennan 1981, Andrews 1975).

Andrews refers to the Salcha band as having a subsistence pattern midway between a hunting-snaring emphasis and an inland riverine (caribou-salmon) emphasis (Andrews 1975). Mishler, in his study of the Goodpaster/Big Delta band, differs with Andrews, referring to a salmon emphasis for both bands (Mishler 1984). Both bands had access to salmon, and a harvest emphasis reflected in the placement of semi-permanent villages along clearwater streams that supported salmon runs. Both bands' subsistence rounds were similar.

In the early fall months, the bands separated into small family units. These dispersed up and down the Tanana River. Some Goodpaster/Big Delta band families went up to Donnelly Dome to hunt Dall sheep. Others hunted moose around Quartz Lake (Mishler 1984). Some Salcha band families went up Delta Creek to more central hunting areas (Andrews 1975; 1977). By mid-October the Goodpaster/Big Delta band would reunite at Big Delta with the Salcha band at the Salcha River to take advantage of the chum salmon runs. In late winter/early spring, the Goodpaster/Big Delta families moved back to the Goodpaster River and would hunt caribou upriver to Healy Lake and to the headwaters of the Goodpaster and Healy rivers. During their migration northward, caribou would appear in the Delta River region in great numbers and pass over the wooded hills along Shaw Creek. The bands regrouped at the semi-permanent villages during the summer months to harvest the salmon runs into early fall and prepare for winter storage.

3.2.7.3.1 Traditional Cultural Properties at Eddy Drop Zone, Donnelly Drop Zone, and North Texas Range Study Areas

It is expected that TCPs will be identified on DTA and will consist of sites and landmarks that reflect the seasonality of subsistence activities. USARAK and the U.S. Air Force 611th CES have an ongoing project, contracted to Tanana Chiefs Conference, Inc. (TCC), to identify and evaluate TCPs that may be present on military managed lands in the interior of Alaska including DTA. No information has been provided to date on USARAK managed lands. A final report is expected at the end of 2005.

3.2.7.4 Archaeological Surveys

Archaeological survey is the process of investigating an area for potential archaeological material. This is performed through literature research, identifying potential existing archaeological material documented through earlier survey work, as well as a review of ethnographic, historic, and other research literature. Based on this information, a pedestrian survey is conducted over the area of interest, with sub-surface examinations occurring either (1) where the potential is high for archaeological material or (2) based on a testing strategy. All sites identified through this method are further examined to determine extent and eligibility for listing in the NRHP.

3.2.7.4.1 Archaeological Surveys of Eddy Drop Zone, Donnelly Drop Zone, and North Texas Range Study Areas

Twenty-three archaeological investigations have been conducted on DTA, identifying 320 sites, to date (Table 3.2.7.c), with 13 of these comprising two archaeological districts. Sixty-six sites have been evaluated and 25 of these are eligible for listing on the NRHP. These investigations have covered 45,810 acres (approximately 8%) of the entire Fort Greely and DTA area. The majority of the archaeological surveys conducted in DTA have been limited to DTA East, which makes up only 25% of the land on DTA. Because of its remote setting, the archaeology of DTA West is poorly understood and represents a gap the understanding of DTA prehistory.

Table 3.2.7.c Archaeological Survey of DTA

Year	Researcher	Survey Location	Result
1963-64	West	Various locations on DTA	25 archaeological sites found
1977	Radich and Reger	XMH-253	1 site investigated
1979	Bacon	XM-1 Tank Rang	No archaeological sites found
1978	Holmes	Various locations on DTA	62 archaeological sites found

1979	Bacon and Holmes	Various locations on DTA	6 archaeological sites found
1980a	Steele	Bison Trail DTA East	3 archaeological sites found
1980b	Steele	Squad Assault Range DTA East	No archaeological sites found
1980	Bacon	Cantonment	No archaeological sites found
1982	Steele	Various locations on DTA	No archaeological sites found
1982	Steele	Donnelly Dome Quarry Site	No archaeological sites found
1983	Steele	Texas Range Power-line	1 archaeological site found
1985	Kotani	XMH-297	1 site investigated
1988	Reynolds	Donnelly Dome WACS	1 archaeological site found
1992	Staley	Various locations on DTA	No archaeological sites found
1995	Gamza	Sullivan's Roadhouse	1 site investigated
1998	Higgs et al.	Various locations on DTA	16 archaeological sites found
1999	Potter et al.	Missile Defense	No archaeological sites found
2001	Holmes	Ski Hill, DTA East	3 sites investigated
2002	Goodman	Power-line on DTA East	No archaeological sites found
2002	Headman et al.	Texas Range, Donnelly DZ, Eddy DZ	110 archaeological sites found[1]
2002	TCC	Donnelly Dome	Pending
2003	Robertson et al.	Eddy DZ	104 archaeological sites found[1]
2004	Robertson	North Texas and Eddy DZ	On-going

[1]Some of these sites represent previously reported sites whose locations were not well documented.

Eleven surveys were "small clearance surveys," for specific proposed projects, which resulted in the discovery of six archaeological sites. Frederick West conducted the first regional survey of the Alaska Range foothills in the 1960s (West 1967). His survey at DTA included the Donnelly and Delta moraine topography. He located 20 sites that form the Donnelly Ridge Archaeological District. This collection of sites has played a significant role in defining the Denali Complex of the American Paleoarctic Tradition.

In 1978, a reconnaissance-level survey was conducted in various areas of Fort Greely and DTA, resulting in the discovery of 60 sites (Holmes 1979). A 1979 survey located four sites (Bacon and Holmes 1980). Northern Land Use Research, Inc., conducted limited archaeological surveys in various areas of DTA, resulting in the identification of 16 additional sites (Higgs et al. 1999). These sites are all located in one of three physiographic settings: high points, bluffs or terraces overlooking a major river or site drainage, or lake margins. There is an inherent bias in these findings, however, as archaeological investigations have frequently focused on high probability settings. USARAK began archaeological surveys of large land blocks in 2002 to address proposed range locations on DTA East. Unlike previous surveys, these provided 100% pedestrian coverage of areas under consideration and an aggressive sub-surface testing strategy. Averaging 20,000 acres per year, these surveys (over two years) identified over 200 new prehistoric sites, only a few of which have been evaluated for eligibility for listing in the NRHP. Information obtained from these surveys is being used to generate a predictive model to better predict the location of sites within other portions of DTA. Based on an evolving predictive model, sites are most likely found in areas containing kettle lakes. These form distinct geographical features paralleling either side of the Delta River and Jarvis Creek, and along the base of the foothills in DTA West. It is highly probable that the number of archaeological sites will greatly increase as surveys continue, and results are incorporated into the predictive model.

The lands of DTA have probably supported human populations for 10,000 to 12,000 years. Because it was ice-free during the Wisconsin glaciation, interior Alaska contains the oldest verifiable prehistoric remains in the state. It is also significant in understanding the "peopling" of the New World. The oldest radiocarbon date for any item found on DTA is 8,555 (± 380) years BP. Some undated material resembles artifacts dating back to 12,000 BP. The prehistory of interior Alaska has recently been divided into five chronological periods along environmental and cultural criteria (Holmes 2000) -- Beringian Period (>11,000 BP), Transitional Period (11,000 to 8,500 BP), Early Taiga Period (8,500 to 5,000 BP), Middle Taiga Period (5,000 to ca. 2,500 BP), and Late Taiga Period (ca. 2,500 BP to present). The limited DTA archaeological record represents all of these recognized periods (Hedman et al. 2003, Robertson et al. 2004).

Archaeological surveys (2002-2004) have identified approximately 210 sites in the Eddy Drop Zone, Donnelly Drop Zone, and North Texas Range study areas. Surveys were initially conducted in the proposed construction footprints of the three alternative sites and then expanded out into the proposed SDZs except for the North Texas Range study area as the SDZ for this alternative is within an existing impact area. Cultural resource management practices are generally not conducted within the SDZ for safety reasons.

Surveys of the Eddy Drop Zone study area identified 12 archaeological sites in the study area's construction footprint and 109 archaeological sites in the SDZ. Four sites within the construction footprint and 14 sites within the SDZ were determined eligible for listing in the NRHP. Because the SDZs for Donnelly Drop Zone and Eddy Drop Zone study areas overlap, the same sites are addressed under each.

A survey of the Donnelly Drop Zone study area identified two archaeological sites within the study area's construction footprint and approximately 105 archaeological sites in the SDZ. (However, based on geographical setting, it is anticipated that approximately 50 additional sites will be found in areas where the survey is not complete.) One site within the construction footprint and 70 sites within the SDZ are eligible for listing in the NRHP.

Twenty-eight archaeological sites are located within the proposed North Texas Range study area construction footprint. Cultural resource management practices were not conducted within the SDZ for safety reasons. The area surveyed for the North Texas Range study area was greater than the proposed footprint. Thirteen sites within the construction footprint are eligible for listing in the NRHP.

3.2.7.5 Architectural Surveys

Architectural surveying is the process of looking at buildings and structures, to identify those that may be eligible for listing in the NRHP. The process begins through archival and literature searches, to determine the potential of finding historic properties in the area of interest, followed by field surveys to record identified buildings and structures. Evaluations of buildings are performed under established historic contexts (i.e., World War II, Cold War Era) that have been identified as having significance, as defined by the NRHP. The survey also must determine whether identified buildings have "historic integrity," as required by the NRHP.

3.2.7.5.1 Architectural Surveys of Eddy Drop Zone, Donnelly Drop Zone, and North Texas Range Study Areas

Historic context studies have been conducted on early mining and early transportation routes on DTA. Based on this early mining study, no properties associated with this activity are expected in

the study area. This study also concluded, with Alaska State Historic Preservation Office concurrence, that any found properties will be ineligible for inclusion in the NRHP. The study on early trails identified a number of historic trails on DTA. This study, however, only identified the Donnelly-Washburn Winter Cut-Off Trail as having potential eligibility for inclusion in the NRHP. This trail was located south of the North Texas Range study area and west of Donnelly Drop Zone study area, outside any potential effects. Beyond these two contextual studies, no systematic surveys have been conducted to identify historic buildings and structures on DTA East that may be associated with other historic contexts. The USARAK Cultural Resources program is proposing to undertake a study in 2005, to look at other historic contexts and identify sites associated with them within the study area. Based on the results of this study, future architectural surveys may be planned.

3.3 SECONDARY ISSUES OF CONCERN

3.3.1 AIR QUALITY

The Clean Air Act (CAA) authorizes the EPA to establish National Ambient Air Quality Standards (NAAQS) to protect public health for six criteria pollutants (i.e., ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_X), sulfur oxides (SO_2), particulate matter (PM_{10} and $PM_{2.5}$) and lead (Pb)). Areas that are in compliance with the NAAQS are referred to as "attainment" areas; while, areas in noncompliance with the NAAQS are designated as "non-attainment" areas. Visibility is a valued and important air quality resource that is regulated under the CAA. This resource is specifically regulated through the Regional Haze Rule (40 CFR 51). States are required to submit plans for improving visibility with the goal of reaching natural visibility conditions by c2004. Stationary, mobile and area sources are regulated under the Regional Haze Rule. Alaska is currently developing regulations to implement the Regional Haze Rule and is in the process of developing a strategy for achieving the mandated goals. A more detailed description of the DTA air quality regulatory framework is provided in the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 1-2.*

When the ambient temperature drops below approximately –20 °F, ice fog, a condition unique to frigid climates, may form and contribute to pollution and visibility problems. Ice fog forms when water vapor is exposed to completely saturated air. Water vapor from sources such as automobiles is cooled so quickly when it is exposed to ambient air, that tiny ice particles are formed. Ice fog is a form of air pollution in populated areas where the topography, combined with strong inversions, causes air to stagnate (Benson 1970). In a study by Benson (1970), the largest source (64%) of ice fog in Alaska was cooling water released into rivers from power plants. Neither DTA nor Delta Junction has this source of ice fog. Combustion of fuels from automobiles, power plants, and fuel oil, accounted for 32% of localized ice fog. The remaining 4% was contributed by miscellaneous sources, such as people, animals, and leaks from houses and steam lines. In the Delta Junction area, frequent strong winter winds help prevent temperature inversions and extended periods of ice fog. On DTA, winter military exercises can cause localized ice fog when groups of vehicles are kept idling in the field, which is common when head bolt heaters are unavailable.

The Alaska Department of Environmental Conservation (ADEC) regulates ice fog as a pollutant. This pollutant is typically regulated through state issued permits. Permittees may be requested to reduce water vapor emissions (State of Alaska 2002). (See *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2* for additional information on air quality regulations.)

Pollutants can also be generated as a byproduct of industrial activities. Fugitive dust is typically generated from daily industrial activities such as bulk material handling, storage, and construction projects. The Delta River and Jarvis Creek are large sources of fugitive dust during wind events in summer, and sometimes during winter months. Heavy machinery and vehicles during construction and personal and tactical vehicles driving on unpaved roads and surfaces can also generate fugitive dust.

3.3.1.1 DTA Regional Air Quality

DTA is designated an "attainment area" for the six regulated NAAQS. DTA is permitted as a separate facility from FWA. Since the annual potential emission is less than 100 tons for any of the criteria pollutants, no Air Quality Operating Permit is required at this time.

No air quality monitoring data exists for DTA, or for any of the surrounding communities. Particulate sampling equipment was recently installed at Fort Greely, but insufficient data have been collected to provide an accurate measure of air quality relative to this pollutant. Air quality at DTA approximates natural baseline conditions, given the low density of human development and emission sources present. While DTA does experience periodic episodes of ice fog, the durations of these ice fog episodes are generally short. Strong and persistent temperature inversions do occur, but, due to the limited number of emission sources, the inversions are unlikely to cause pollutant levels that exceed the NAAQS.

3.3.1.1.1 Air Quality Status at Eddy Drop Zone, Donnelly Drop Zone, and North Texas Range

DTA is not a Prevention of Significant Deterioration (PSD) Major Facility, and is permitted separately from FWA, as it is outside the installation boundary and is noncontiguous. One small back-up generator is used to power lights in an on-site dining facility when necessary. The Golden Valley Electric Association provides primary electrical power.

3.3.1.1.2 Other Required Permits at Eddy Drop Zone, Donnelly Drop Zone, and North Texas Range

USARAK currently has a Conditional Fog Permit, amended and renewed in 2004 by the ADEC, to conduct fog oil training at DTA including Eddy Drop Zone, Donnelly Drop Zone, and North Texas Range study areas. This permit was issued under 18 AAC 75.800 (Permit for Oil Discharge for Scientific Purposes). Fog oil is a battlefield obscurant used to produce a smoke screen to mask troops and troop locations. It is created when a petroleum distillate is heated and expelled from stationary and mobile smoke generators. Upon contact with the air, the expelled oil droplets condense to form a thick white smoke. The Conditional Fog Permit, renewed annually, allows the use of up to 6,000 gallons of fog oil and 2,000 gallons of kerosene per Federal fiscal year. The impacts of fog oil smoke training activities at USARAK were previously assessed, leading to a Finding of No Significant Impact (USARAK 2000c).

Smoke generation training would be conducted within the BAX and CACTF facilities, including the use of fog oil smoke generators (both stationary and vehicular-mounted units), smoke grenades, and smoke pots. Smoke generation is subject to several limitations, as outlined in USARAK Regulation 350-2, *Range Regulation* (USARAK 2004b).

For the use of smoke grenades and smoke pots, regulations require the following:

- Computations to consider temperature gradients and the direction and speed of the wind.
- Test grenades to be used before smoke pots are employed.
- Complete dissipation of all smoke before leaving the reservation boundary.
- Under marginal conditions, employ an NBC-qualified officer to evaluate all factors and recommend the type and uses of smoke.

For the use of fog oil, regulations and permit conditions require the following:

- All requests for smoke generation to be reviewed (and commented on) by the 172nd Infantry Brigade, Chemical Platoon before submission to Range Control.
- Units to record amount of fog oil and diesel fuel-arctic used when smoke is produced, the rate of movement of the fogger, global-positioning-system data for locations of foggers, temperature, and wind speed and direction; and to provide the information to Range Control.
- Smoke generation not permitted within 300 meters of a water body (i.e. lakes, rivers, or streams); within 1,000 meters of the post border, urban area, and cantonment area; within 500 meters of the Richardson Highway; or within 100 meters of the Alaska Railroad tracks.
- Spill-prevention measures to be taken to prevent spills while using and refueling smoke generators. Spill-response equipment to contain and cleanup any spills that occur must be available in the field. All spills are to be immediately reported to Range Control.
- Use of the smoke generators to be annotated on all range requests that include smoke generation. Range managers are required to capture utilization data in the RFMSS.
- Units to give no less than 12 working days prior notice when requesting smoke operations.
- Units to consult fog-oil smoke maps when requesting such training. These maps will show the environmental/geographical restrictions and are available at Range Control.
- Smoke will be generated from stationary and mobile sources during the training activities.

In addition to maintaining a Conditional Fog Permit for the facility, USARAK must periodically obtain municipal burn permits in order to accomplish prescribed burns. These prescribed burns are conducted to maintain range safety. USARAK coordinates these prescribed burning activities with the AFS. AFS is the lead for prescribed burning on USARAK lands. USARAK and AFS coordinate with the ADEC and the local municipality when conducting prescribed burns that are greater than 40 acres in a given year. The burns are conducted in accordance with air quality regulations and conditions included in the burn permits.

3.3.2 GROUNDWATER

Groundwater, found below the earth's surface, is comprised of water that percolates through the soil from the surface. Groundwater can be found almost everywhere at DTA, in variable quantities at different locations. The water table may be deep or shallow, and may rise or fall, depending on many factors, such as heavy rains, melting snow, or extended dry periods. These can also affect the pressure of groundwater, called the "hydraulic head pressure," and groundwater yield (often measured in gallons per minute). Groundwater collects in formations called aquifers, in layers of substrate. The rate at which groundwater flows (hydraulic conductivity) depends on the hydraulic head pressure, the size of the spaces in the soil or rock (porosity), and how well the spaces are connected (Groundwater Foundation 2002). A "confined"

aquifer has limited vertical movement due to a confining layer above, while an "unconfined" aquifer is attached to other aquifers, and water can flow easily into (and out of) the aquifer.

3.3.2.1 Groundwater Flow

Groundwater flow determines the amount of groundwater available for diversion or use, as well as the recharge rates for groundwater withdrawals. The flow gradient indicates the direction in which groundwater is flowing, thereby enabling better planning for groundwater withdrawal, recharge, or contamination.

Flow data may also indicate the type of groundwater system (or systems) located within an area. For example, many areas in interior Alaska contain both an upper overlaying water table, an unconfined aquifer, and a deeper groundwater pool, a confined aquifer.

3.3.2.1.1 Groundwater Flow at Eddy Drop Zone, Donnelly Drop Zone and North Texas Range

The principal groundwater aquifer of the DTA East and the Delta Junction area is in the permeable sands and gravels of the broad coalescing alluvial fan or outwash plains that run from the Alaska Range north to the Tanana River. The alluvial aquifer system is recharged from streams and from infiltration of precipitation. Most recharge occurs in late spring and early summer, when ground thawing permits penetration of melt water and flow increases in surface streams. Jarvis Creek and the Delta River lie above the aquifer, and a considerable portion of their flow infiltrates from the streambeds to the groundwater table.

The water table slopes north at gradients ranging from one to 25 ft per mile, a lower gradient than the slope of the ground surface. Consequently, the depth to the water table decreases down slope from nearly 400 ft near the mountains, to 180 ft in the vicinity of Fort Greely and Eddy Drop Zone, to 80 ft at Delta Junction, and to 10 ft at Big Delta at the Tanana River. Annual fluctuations of the water table depth ranges from 50 to 60 ft in the Fort Greely area to two to three ft at Big Delta. Data from the northern portion of DTA East indicate that groundwater levels are lowest in late May or early June, after which recharge from surface waters reaches the aquifer. The groundwater levels rise through the summer and peak in October, after which the rivers freeze and recharge ceases (Wilcox 1980). The thick sand and gravel alluvium result in high transmissivity for the aquifer.

Well yields in the DTA are as high as 1,500 gallons per minute (Wilcox 1980). In the northern, western, and eastern portions of DTA East, as the aquifer approaches the surface and the Tanana River, water is discharged from the alluvial aquifer system to the surface water system, often as springs. Clearwater River and Clearwater Lake are almost entirely spring fed. This is substantiated by the fact that these areas remain unfrozen during the winter months, because of the inflow of relatively warm (40° F) groundwater. Springs are also present near the mouth of the Delta River (Wilcox 1980).

3.3.2.2 Groundwater Quality

Groundwater quality describes the presence and concentrations of various minerals and pollutants found in the groundwater. This data is useful in determining the level of hazard or health risk (environmental or human) associated with groundwater, as well as in determining the possible range of uses for groundwater resources.

Although surface water is abundant in the Tanana River Basin, most of DTA's potable water is obtained from groundwater wells. The largest potential groundwater supply is in the floodplain alluvium along the Little Delta River, Delta River, Delta Creek, and Jarvis Creek, and in alluvial fans extending along northern flanks of the Alaska Range. The surface to groundwater depth at DTA is between 100 and 210 ft, and most DTA wells draw water from unconfined aquifers in unconsolidated alluvial deposits. Groundwater recharge seeps from glacier-fed streams.

Population density near DTA is sparse. Few wells have been drilled on the installation, and data for groundwater quality are limited to areas in the immediate vicinity of the Fort Greely Main Post. Most of the available groundwater quality data were obtained during the early 1950s through the 1970s, and appear to provide a reasonable estimate of the region's natural groundwater quality. Some groundwater wells within Fort Greely were drilled in response to specific chemical or waste spills or hazardous materials operations. Limited groundwater monitoring wells have been drilled on DTA specifically to monitor for (and to measure) explosive contaminants, and limited groundwater quality data are available for the impact areas.

3.3.2.2.1 Groundwater Quality at Eddy Drop Zone, Donnelly Drop Zone and North Texas Range

Available data indicates that groundwater quality is good at DTA. All measurements were below concentrations recommended by the Alaska Drinking Water Standards. For example, pH values were within the acceptable range of 6.5 to 8.5, and sodium values ranged from 5.1 mg/l at Donnelly Flats to 3.2 mg/l at Black Rapids, all within the standard of 250 mg/l. Sulfate, chloride, fluoride, nitrate, and iron values are also within state standards. Dissolved solids values ranged from 153 mg/l (at well G-13) to 225 mg/l (at well G-10), and these values are within the standards (USARAK 2004a). Additional groundwater data can be found in the *Final Environmental Impact Statement Transformation of U.S. Army Alaska, Vols. 1 and 2.*

3.3.3 WETLANDS

Wetlands are transitional ecosystems, where the water table is at (or near) the soil surface, and where the presence of the high water, during the growing season, heavily influences the types and distribution of soils and plants (Cowardin et al. 1979).

3.3.3.1 Wetland Types

Types of wetlands in Alaska include floodplains, lower elevation areas with standing water for at least 10% of the growing season, areas periodically flooded by tides, and other areas supporting wetland plant communities. Army lands in Alaska have both saltwater wetlands (tidal flats and estuaries) and freshwater wetlands (freshwater marshes, bogs, and fens), which are distinguished by water source and/or vegetation types.

Marshes are covered by water most of the time, and these types of wetlands lack woody vegetation. Both tidal and non-tidal marshes exist in Alaska.

Bogs recharge their water systems through rainfall or snowmelt, and are often found in depressions that are poorly drained. Bogs tend to have a deep peat layer and are covered with sphagnum moss. These areas are acidic and nutrient poor.

Fens are types of bogs, but are fed through groundwater systems. Fens have a shallower peat layer and are less acidic than bogs. The vegetation tends to be more diverse in fens.

Approximately 68% (431,940 acres) of DTA is wetland (Lichvar 1998), with palustrine, riverine, and lacustrine types included. The palustrine shrub wetlands are the most common types of wetlands found on DTA.

The most prevalent types of wetlands at DTA include:

Alpine Tussock Meadow and Alpine Wet Low Scrub (6%) – Characterized by loamy soils, underlain by permafrost, that are moderately to strongly acidic. These areas are found above tree line, primarily in the southern portion of DTA West, along the foothills of the Alaska Range.

Lowland Wet Low Scrub and Lowland Tussock Scrub Bog (35%) – These palustrine wetlands are characterized by loamy soils that are poorly drained because of permafrost. The bogs contain sedges, tussock meadows, and lowland moist meadows with bluejoint reedgrass (*Calamagrostis canadensis*). Willows, dwarf birches, and forbs may also be present.

Lowland Wet Forests (12%) – Loamy soils that are poorly drained and moderately acidic. Broadleaf types dominated by paper birch (*Betula papyrifera*), needleleaf forests by black spruce, and mixed forests co-dominated by both species. This area is common along the northern portion of the Lakes Impact Area and the Little Delta Training Area.

Riverine and Lacustrine Wetland Complexes (2%) – Characterized by moist, loamy soils, dominated by forest (needleleaf, broadleaf, or mixed), shrubs (willows and alders), or meadows. Wetlands located along the Delta and Little Delta rivers and Jarvis Creek are riverine systems.

Existing wetlands data consist of polygons mapped for the National Wetlands Inventory (NWI), conducted by the USFWS in the late 1980s. This inventory was based on aerial photography interpretation, and overlooked some smaller wetlands. As these polygon boundaries were transferred to a Geographical Information System (GIS), small errors were introduced regarding the boundaries between wetlands and uplands. This inventory provides the basis for wetlands analyses in this document.

3.3.3.1.1 Wetland Types at Eddy Drop Zone

A wetland survey was conducted within the BAX and CACTF study area (ABR, Inc. 2004) (Appendix, Figure 3.t). Wetlands comprised about 17% of the BAX study area and 13% of the CACTF. The predominant wetland type is dwarf needleleaf scrub, with permafrost located within 20 inches of the soil surface. The second most common wetland type is needleleaf forest. High value wetlands (areas important to waterfowl or sites with regionally important hydrological and ecological functions) are restricted mainly to the southeastern section of the proposed BAX area. High value wetlands in the area include ponds with margins of emergent vegetation (ABR, Inc. 2004).

3.3.3.1.2 Wetland Types at Donnelly Drop Zone

While a wetland survey has not been conducted within the Donnelly Drop Zone study area, a similar analysis of wetland types was derived from the NWI maps using GIS (Appendix, Figure 3.u). Wetlands comprise about 30% of the combined BAX and CACTF study area. Willow scrub is the most predominant wetland type at 12% of the study area. The second most common wetland type is dwarf needleleaf scrub, which covers 5% of the study area.

3.3.3.1.3 Wetland Types at North Texas Range

While a wetland survey has not been conducted within the North Texas Range study area, a similar analysis of wetland types was derived from the NWI maps using GIS (Appendix, Figure 3.v). Wetlands comprise about 22% of the combined BAX and CACTF study area, and ponds and lakes cover 5%. Willow scrub is the most predominant wetland type at 10% of the study area. The second most common wetland type is sedge/scrub wet meadow, which covers 6% of the study area.

3.3.3.2 Wetland Management

USARAK classifies wetlands as "high-function" or "low-function" for management purposes, a distinction not mandated by Federal or state policies. High-function wetlands include riverine areas, permanent emergent areas, semi-permanent emergent areas, riparian areas, and other sensitive wildlife habitats that lie within any wetland areas. Low-function wetlands include all other wetland types.

USARAK has obtained a Clean Water Act, Section 404 five-year permit (2000 to 2005) from the USACE to conduct military training in wetlands at FWA and DTA. This permit allows limited maneuver or other military activities to occur in some wetland areas, where no such activity was permitted in the past. Under this permit, USARAK cannot damage more than 40 wetland acres per year. If that acreage is exceeded, training in wetlands will be prohibited, and individuals may be liable for fines and other penalties. Restoration of all damage is mandatory.

Environmental limitations overlays were developed as a tool for planning military training activities and managing wetlands (Figures are located in Appendix A of the *Final Environmental Impact Statement Transformation of U.S. Army Alaska, Vol. 2*). Each overlay is available in a summer and winter version with approved and restricted activities listed in three color-coded categories. The summer version is the more restrictive of the two. These overlays are available at Range Control or the Integrated Training Area Management (ITAM), office where staff can provide instructions on how to use them. See Appendix E of the *Final Environmental Impact Statement of U.S. Army Alaska, Vol. 2*, for tables of specific training activities that are approved and restricted under the wetland permit.

During summer, the green, yellow, and red categories on the environmental limitations overlays include the following restrictions:

- **Green.** No environmental restrictions. However, all normal procedures outlined elsewhere in USARAK Regulation 350-2 should be followed.
- **Yellow.** Notify Range Control when planning to train. Environmental/ITAM staff must pre-survey area. Stream crossings are permitted at 90-degree angles only.
- **Red.** Notify Range Control when planning to use areas. Environmental/ITAM staff must pre-survey red area to determine on-the-ground limits of each red area. Open water and streams have a 150-foot buffer. Only foot maneuvers are allowed in buffer. Vehicular maneuver is not allowed except during stream crossings, which must be crossed at a 90-degree angle to the direction of the stream flow. No stream crossing at shear or cut banks. Earth moving, mechanical digging, bivouacs, assembly areas, fighting positions, timber cutting, laundry and bath sites, portable latrines, slit trenches, vehicle decontamination, smoke generation, and any POL distribution are restricted.

During winter, the green, yellow, and red categories on the environmental limitations overlays include the following restrictions:

- **Green.** No environmental restrictions. However, all normal procedures outlined elsewhere in USARAK Regulation 350-2 should be followed.
- **Yellow.** Notify Range Control when training. Environmental/ITAM staff must pre-survey these areas. Stream crossings may occur at 90-degree angles only. Use caution when snow plowing. Minimum of six inches of snow pack must remain on trails or other clearings to minimize damage to vegetation and soils. Activities limited include tracked and wheeled maneuvers, bivouacs, assembly areas, defensive fighting positions and timber cutting. These activities may be approved on a case-by-case basis by Range Control and ITAM staff if there are no seasonal wildlife restrictions.
- **Red.** Notify Range Control when using areas. Environmental/ITAM staff must pre-survey areas to determine on-the-ground limits of each red area. Open water and streams have 150-foot buffer. Only foot maneuvers are allowed in buffer. Vehicular maneuver is not allowed except during stream crossings, which must be crossed at a 90-degree angle to the direction of the stream flow. No stream crossing at shear or cut banks. Earth moving, mechanical digging, bivouacs, assembly areas, fighting positions, timber cutting, laundry and bath sites, portable latrines, slit trenches, vehicle decontamination, smoke generation, and any POL distribution are restricted.

3.3.3.2.1 Wetland Management at Eddy Drop Zone, Donnelly Drop Zone and North Texas Range

Wetlands will be considered in the final engineering plans and layout of all proposed range components. The NWI is utilized during each design phase to assure that wetlands will be avoided, when practicable. Wetlands are often associated with permafrost-rich soils, which would be identified during geotechnical surveys. For all of the CACTF and most of the BAX range components, care will be taken to avoid permafrost and associated unnecessary construction and long-term maintenance costs.

Detailed wetland delineations will be completed as final designs of the proposed BAX and CACTF facility are completed, and the exact locations of targets, trails, buildings and other construction elements are better known. Wetlands may (or may not) qualify as jurisdictional wetlands, as defined in Section 404 of the Clean Water Act. The USACE determines jurisdictional wetlands on the basis of hydric soils, vegetation, and hydrology. USARAK will submit an appropriate wetland application, delineating exact amounts of wetlands to be filed. An approved permit would be obtained prior to construction. In addition to construction footprints, the USACE has requested the permit application to include anticipated training use that may take place in wetlands in the general area of the proposed BAX and CACTF. The USACE coordinates wetland applications with state and other Federal agencies that either have a vested interest in wetlands, or have some other regulatory oversight. This wetland permit application also receives public review, and public comments are considered (incorporated) in the resulting permit by the USACE.

USARAK will also apply to renew the existing five-year Section 404 permit to conduct military training in wetlands at FWA, including DTA. This application will include a request to modify the permit to include the use of the Stryker vehicle. USARAK would continue to classify wetlands as “high-function” or “low-function” for management purposes, and would continue to

use the environmental limitations overlays for planning military training activities and managing wetlands.

3.3.4 VEGETATION

The distribution of plant communities is influenced by factors such as climate, physiography, geomorphology, hydrology, soils, and fire. The major attributes of plant communities include growth form and structure, diversity, species dominance, and relative abundance (Krebs 1994).

The lands used by USARAK can be broadly classified into four terrestrial ecosystems (forests, scrub lands, barren lands and tundra) and a transitional ecosystem (wetlands) (discussed in Section 3.3.3). Within each of these ecosystems, a number of cover types exist, and these will be discussed in further detail below.

3.3.4.1 Vegetative Cover

3.3.4.1.1 Forests

Forest cover at DTA is diverse, and includes pure stands of spruce, hardwoods, and spruce/hardwood mixtures. The dominant types include white spruce, paper birch, quaking aspen, balsam poplar, black spruce, and spruce/hardwood. Descriptions and general distribution of the forest cover types at DTA are as follows (Jorgenson et al. 2001):

- **White Spruce:** White spruce occurs on well-drained upland sites that lack permafrost. White spruce stands also exist on waterlogged sites or dry, sunny slopes. On north and east-facing slopes, white spruce is confined to drainage ways and the tops of slopes.
- **Paper Birch:** Paper birch is found primarily on upland sites and occurs on most exposures. Paper birch can tolerate conditions underlain by discontinuous permafrost.
- **Quaking Aspen:** Quaking aspen is common on south slopes, well-drained benches, and creek bottoms to an elevation of about 3,000 ft. The most vigorous stands occur on warm, dry slopes. It is almost completely absent from wet, north-facing slopes.
- **Balsam Poplar:** Poplar stands are found along alluvial river deposits. Poplar is well adapted to river bars, stream bends, and lakeshores, where it may form nearly closed stands. Stands are common along the Tanana, Delta and Little Delta rivers.
- **Black Spruce:** Black spruce, the most common forest cover type on DTA, dominates areas where permafrost is near the soil surface. Typical sites are cold, wet, poorly aerated and poorly drained. Lakes and bogs often have surrounding stands of black spruce characterized by short and narrow-crowned growth forms. Black spruce stands on DTA are also found on dry sites that have gravelly soils and thin organic layer.
- **Spruce/Hardwood:** Spruce/hardwood forests predominate on lowland forest areas. White spruce/balsam poplar stands are found in floodplains and low river terraces. White spruce is also found mixed with paper birch on moist sites and with quaking aspen on drier sites. Tamarack is found with black spruce in lowland areas and occasionally with paper birch.

3.3.4.1.2 Scrub Communities

Scrub communities occur at high elevations, in small stream-valley bottoms, and as “pioneer” vegetation on disturbed sites, including areas recovering from fire. Typical scrub fields are composed of alder, willow, and dwarf birch.

3.3.4.1.3 Barren Lands and Tundra

Most barren areas on DTA are located on gravel bars along the Delta River, the Little Delta River Delta Creek, Jarvis Creek, and Granite Creek (Jorgensen et al. 2001). Barren lands occur above tree line, along ridges, and adjacent to rivers and streams.

Higher elevation sites along the southern portion of DTA support moist tundra, which grades into alpine tundra, and then into barren land. These areas occur on MacArthur Mountain, Patton Mountain, Molybdenum Ridge, and Trident Glacier (USARAK 1980; Jorgenson et al. 2001). Viereck et al. (1992) and Racine et al. (2001) described Tundra communities for the region and for DTA:

- **Dwarf Birch Low Shrub Tundra:** Usually found just above tree line of spruce forests.
- **Crowberry/Blueberry Dwarf Shrub Tundra:** This is the most common type tundra on DTA. Although these two species intermingle, blueberry tundra sites tend to be more exposed.
- **Cassiope Dwarf Shrub Tundra:** Occurs on moist alpine sites, commonly north-facing slopes.
- **Dryas-Sedge-Lichen Dwarf Shrub Tundra:** Found on many of the higher ridges and exposed slopes.

3.3.4.1.4 Vegetative Cover at Eddy Drop Zone Study Area

Potentially affected land at the Eddy Drop Zone study area is primarily needleleaf, broadleaf, and mixed forest vegetation with some low scrub (Appendix, Figure 3.w). Ranges would be sited primarily in forested areas, but would also make use of the existing cleared drop zone.

3.3.4.1.5 Vegetative Cover at Donnelly Drop Zone Study Area

Potentially affected land at the Donnelly Drop Zone study area is primarily low scrub, needleleaf forest, and shrub tussock vegetation (Appendix, Figure 3.x). Ranges would more affect the needleleaf forest, since range construction sites would need to be on the western side of the study area to avoid Jarvis Creek.

3.3.4.1.6 Vegetative Cover at North Texas Range Study Area

Potentially affected land at the North Texas Range study area is primarily low scrub and shrub tussock vegetation (Appendix, Figure 3.y). There is relatively little forest or other taller vegetation on the North Texas Range study area, compared to the other study areas.

3.3.4.2 Floristic Inventory

Racine et al. (2001) completed a floristic inventory of DTA. Although the survey did not include all possible taxa on the post, it is the most comprehensive survey to date. The inventory documented 497 vascular taxa (including subspecies and varieties) in 64 families and 198 genera. About 26% of vascular plants found in Alaska (Hultén 1968) were identified in the survey of DTA. The authors also documented approximately 22 vascular plant range extensions (Racine et al. 2001).

USARAK's Land Condition Trend Analysis (LCTA) program includes an annual study of flora on DTA lands (1997-2003). This program provides for the collecting, inventorying, monitoring,

managing, and analyzing of DTA plant species (including rare plants). Physical and biological resource data are collected to correlate land conditions to training and testing activities. These data provide information to effectively manage land use and natural resources.

During the summer of 2004, LCTA field personnel surveyed specifically for rare plants listed below in Table 3.3.4.a at each of the three study areas. They targeted potential habitats and unusual habitats, and looked at areas that would be impacted by construction footprints. The information is summarized in Sections 3.3.4.2.2, 3.3.4.2.3, and 3.3.4.2.4.

3.3.4.2.1 Listed and/or Rare Plants

Interior Alaska has no Federally-listed threatened, endangered, or candidate plant species. The Appendix contains a copy of a letter from the USFWS, confirming that no Federally-listed species are known on Army lands in Alaska, and that consultation under Section 7(a)(2) of the Endangered Species Act, 16 USC 1536(a)(2) is not required.

Table 3.3.4.a indicates those vascular plants that could be found on DTA (Racine et al. 2001, updated), and that are being tracked by the Alaska Natural Heritage Program's Biological Conservation Database (Alaska Natural Heritage Program (AKNHP) 2004).

Table 3.3.4.a Global and Alaska Rankings for Donnelly Training Area Plants Being Tracked by the Alaska Natural Heritage Program

Species	Common Name	Global Ranking*	Alaska Ranking**
Artemisia laciniata	lacinate sagewort	G5	S2
Carex atratiformis	Scabrous black sedge	G5	S2
Carex crawfordii	Crawford's sedge	G5	S2S3
Carex deweyana	Dewey sedge	G5	SE?S1
Carex eburnea	bristleleaf sedge	G5	S2S3
Carex sychnocephala	manyhead sedge	G4	S1
Cryptogramma stelleri	fragile rock-brake	G5	S2S3
Dodecatheon pulchellum ssp. *pauciflorum*	few flowered shooting star	G5T5Q	S2
Draba incerta	Yellowstone draba	G5	S2S3
Glyceria pulchella	MacKenzie Valley mannagrass	G5	S2S3
Phlox hoodii	spiny phlox	G5	S1S2
Phlox sibirica ssp. *richardsonii*	Richardson's phlox	G4T2T3Q	S2?
Potamogeton obtusifolius	bluntleaf pondweed	G5	S1
Salix setchelliana	Setchell's willow	G4	S3
Saxifraga adscendens spp. *oregonensis*	small saxifrage	G5T4T5	S2S3
Sisyrinchium montanum	strict blue-eyed grass	G5	S1
Stellaria alaskana	Alaska starwort	G3	S3

Viola selkirkii	Selkirk's violet	G5?	S3

*** Alaska Natural Heritage Program Rare Species Global Rankings**

G3 Either very rare and local throughout its range or found locally in a restricted range (typically 21to 100 occurrences)

G4 Apparently secure globally

G5 Demonstrably secure globally

G#G# Global rank of species uncertain; best described as a range between the two ranks
G#T# Global rank of species and global rank of the described variety or subspecies of the species
Q Taxonomically questionable
? Inexact

**** Alaska Natural Heritage Program Rare Species State Rankings**

S1 Critically imperiled in the state because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation from the state (typically five or fewer occurrences, or very few remaining individuals or acres)

S2 Imperiled in the state because of rarity or because of some factor(s) making it very vulnerable to extirpation from the state (typically six to 20 occurrences, or few remaining individuals or acres)

S3 Rare or uncommon in the state (typically 21to 100 occurrences)

S4 Apparently secure in the state, with many occurrences

S#S# State rank of species uncertain; best described as a range between the two ranks
SE possibly introduced

Salix setchelliana and *Stellaria alaskana* are endemic to the region. Other taxa in Table 3.3.4.a are peripheral species, with larger populations centered further south in North America or west in Asia.

USARAK used its Ecosystem Management Analysis program to determine the quality of habitat in each study area for each sensitive plant species. This program generated maps based on the Ecological Land Survey (Jorgenson et al. 2001) ecotype geographic information system layer and USARAK-assigned habitat preference values for each species of concern. Types of habitats occupied by these plants were obtained from the floristic inventory (where they were actually found on post), from local expertise, and also based on information given with each species description in three reference books: *Anderson's Flora of Alaska and Adjacent Parts of Canada* (Welsh 1974), *Flora of the Yukon Territory* (Cody 1996), and *Flora of Alaska and Neighboring Territories* (Hulten 1968). These maps suggest if potential habitat is available for any AKNHP-listed species at each of the study areas.

3.3.4.2.2 Floristic Inventory at Eddy Drop Zone Study Area

Previous inventories documented four of the AKNHP-listed species within the Eddy Drop Zone study area. These include *Carex deweyana*, *Carex atratiformis*, *Viola selkirkii* and *Crytogramma stelleri*. The 2004 surveys documented two of these species (*Carex atratiformis* and *Viola selkirkii*) as well as *Carex eburnea*. *Carex atratiformis* is common on the Eddy Drop Zone study area in disturbed sites. *Carex eburnea* is uncommon due to the absence of suitable habitat. *Carex deweyana* and *Cryptogramma stelleri* were discovered within the Eddy Drop Zone study area (the only known locations on DTA), but populations could not be located during the 2004 survey. The Eddy Drop Zone study area also contains the only known population of *Viola selkirkii* on DTA. Plants are abundant, though restricted to a very small area.

3.3.4.2.3 Floristic Inventory at Donnelly Drop Zone Study Area

Previous inventories documented only one of the AKNHP-listed species within the Donnelly Drop Zone study area (*Carex atratiformis*). During the 2004 survey it was found to be widespread and common on disturbed sites. *Carex crawfordii* was expected at this site but was not found, although small populations occur just outside the Donnelly Drop Zone study area. *Carex eburnea* was found at a few sites in favorable habitat near Jarvis Creek. No other rare plants were found in the 2004 survey; however, *Carex deweyana* and *Dodecatheon pulchellum ssp. pauciflorum* are possible based on available habitat.

3.3.4.2.4 Floristic Inventory at North Texas Range Study Area

Though previous surveys did not document any AKNHP-listed rare plants in the North Texas Range study area, a few species were discovered in the 2004 surveys. These included large populations of *Carex crawfordii* mostly along pond margins. *Carex sychnocephala*, previously known from only one site on DTA, was discovered in a number of pond margins often growing with *C. crawfordii*. *Carex atratiformis* was found a several sites. *Dodecatheon pulchellum ssp. pauciflorum* is widespread and common in upland areas at this study area. Previous inventories have documented *Artemisia laciniata* and *Potamogeton obtusifolius* near the North Texas Range study area and, though expected, they were not found in the 2004 survey.

3.3.4.3 Ecological Land Classification

A four-tiered ecological classification system, developed by Bailey (1995), is used by Federal agencies, including the DoD. The system describes geographical areas from regional to more localized ecosystem categories. DTA lies within the Polar Domain, Subarctic Division, Alaska Range Humid Taiga Tundra-Meadow Province, and Alaska Mountains Province (Bailey 1995). Vegetation can then be categorized further according to ecosystems, terrestrial cover types, and species associations.

The lands used by USARAK are within the Polar Domain, which is characterized by low temperatures, severe winters, and relatively low precipitation. These lands are also within the Subarctic Division, which is influenced by cold snowy climate. The dominant forests in the Subarctic Division are boreal subarctic type forests, open lichen woodlands, and taiga. Ecosystem Divisions are further subdivided into ecosystem Provinces and Sections, depending on vegetative features. The *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2,* Appendix E, presents additional descriptions of ecological features for relevant Provinces and Sections.

Bailey's general classification system is further detailed through an Ecological Land Classification System, described by Jorgensen et al. (1999, 2001, 2002). This system links the vegetation cover types to specific ecological districts within each post. DTA was intensively surveyed from 1998 to 2000. The maps created for the ecological land classification demarcate ecodistricts, ecosubdistricts, and ecotype classes (Jorgenson et al. 1999, 2001, 2002):

> **Ecodistricts** are large physiographic units (1:500,000 scale) within a climatic region that have similar moisture regimes, radiant solar energy exposure, geology, geomorphology, and hydrology. Names of ecodistricts are based on prominent geographic features and broad land forms.

Ecosubdistricts are smaller physiographic units (1:100,000 scale) that have similar associations of vegetation, soils, permafrost characteristics, water, and fauna. These also tend to be named after prominent geographic features.

Ecotype classes are the smallest descriptive units (1:20,000 scale), and these have associated species lists. Ecotype classes represent vegetation types or successional stages within a uniform soil and geomorphic class.

3.3.4.3.1 Ecological Land Classification at Eddy Drop Zone

Broadleaf, needleleaf and mixed forest ecotypes cover over 80% of the Eddy Drop Zone study area. All common DTA tree species occur here including some of the most vigorous stands of birch and white spruce. Soils are generally moist to dry, though wetland areas do occur. Understory shrub species include willow (*salix sp*), alder (*alnus sp*), rose (*Rosa acicularis*) and Labrador tea (*Ledum groendlandicum*). Common grasses and forbs include bluejoint reedgrass (*Calamagrostis canadensis*), altai fescue (*Festuca altaica*), fireweed (*Epilobium angustifolium*), twinflower (*Linnaea borealis*) and bunchberry (*Cornus canadensis*)

3.3.4.3.2 Ecological Land Classification at Donnelly Drop Zone

Needleleaf and mixed forests cover 47% of the Donnelly Drop Zone study area. Most forest types are classified as "wet" or "moist." Another 48% of this area is covered by "scrub" ecotypes. Most of this area is wetland. Black spruce predominates in the forest ecotypes and is a significant component of the scrub ecotypes as well. White spruce and cottonwood are the other dominant tree species in this area. The shrub components of the forest ecotypes is similar to dominant species in the scrub ecotypes, and include willow, alder, dwarf birch (*Betula nana*) and Labrador tea. Common grasses and forbs are similar to those in the Eddy Drop Zone study area.

3.3.4.3.3 Ecological Land Classification at North Texas Range

Over 80% of the North Texas Range study area is classified as "scrub." The majority of this area is wetland. The remaining ecotypes are mostly forest, although, trees are generally short and stunted due to higher elevation and persistent winds. Shrub and grass/forb species in this area are similar to those at the Donnelly Drop Zone study area. This site also contains a number of small lakes, ponds and wet sedge meadows.

3.3.4.4 Forest Management

DTA forest management areas are described in USARAK Regulation 200-3, *Natural Resources – Land, Forest, and Wildlife Management* (USARAK 2002a). Many potential timber stands at DTA are unharvestable, as they are located in areas contaminated by UXO. Current commercial potential for the remainder is limited to firewood and sawtimber and half-log white spruce markets.

About 60% of DTA (391,851 acres), as well as the Gerstle River Training Area, were inventoried for forest resources in 1993 (Tanana Chiefs Conference Inc. 1993). Cover types were classified according to their commercial forest potential.

Approximately 40% (158,000 acres) of the surveyed area at DTA had commercial forest potential, while 54% was classified as non-forested land, 3% as rivers, and 3% as other waters. Sawtimber stands at DTA covered 1,555 acres and pole timber stands comprise 58,102 acres.

Approximately 132 acres of white spruce sawtimber could be harvested annually. Hardwood harvest could occur on 219 acres per year (Tanana Chiefs Conference Inc. 1993).

USARAK is currently conducting a forest inventory of all USARAK lands, based on the USDA Forest Service permanent plot protocol. Completion of data analysis is estimated by spring 2005. An updated wildfire fuels map and a forest stand map will also be completed by spring 2005. A timber cruise was completed during the summer of 2002 for all forest stands with potential commercial timber (saw-logs and firewood) within the proposed project alternatives. A total of 778 acres contain commercially valuable timber within all three proposed sites. This represents 1,795,327 cubic feet of timber (Buzby and Rees 2003).

There could be a one-time timber sale on the proposed BAX and CACTF alternative sites to clear timber for range construction. However, there are issues (primarily available markets) that might make this type of removal impracticable.

The BLM has management responsibility for vegetation rights at all three proposed BAX and CACTF site. Timber sales would be coordinated with BLM and adhere to USARAK and BLM requirements. A timber cruise would be conducted to determine the volume and value of affected timber after the final construction footprint is determined. The current value of such timber, based on state of Alaska, Division of Forestry firewood timber sales, is approximately $2.00 per hundred cubic feet of timber. BLM requires any usable timber that cannot be sold in a timber sale to be made available to the public at no cost. A USARAK and BLM firewood permit would be required.

Forest management at the study areas could include timber, fuelwood, or Christmas tree sales; to accomplish military or ecosystem objectives and/or timber stand improvement, timber management, timber sales, and timber salvage cuts to accomplish habitat improvement, or to improve the commercial value of forest tree species (USARAK 2002c). Considering forest management priorities and available markets, commercial sales of forest resources are not expected in any of the study areas in the foreseeable future, with (or without) the proposed action.

3.3.4.4.1 Forest Management at Eddy Drop Zone

The Eddy Drop Zone study area is classified as a medium priority for forest management during 2002-2006. The actual Eddy Drop Zone, however, is high priority, as it must be maintained free of trees.

The Eddy Drop Zone study area consists of 858 acres of commercial forest land. Commercial quality forest land is defined as having spruce or hardwoods greater than 4.5 inches in diameter at breast height. The white spruce forest types over nine inches in diameter at breast height comprise 175 acres and 347,550 cubic feet. Birch and aspen forest types account for 190 acres and 149,340 cubic feet. White spruce, birch, and aspen mixed forest types account for 437 acres and 414,280 cubic feet. White spruce and balsam poplar mixed forest types account for 56 acres and 139,940 cubic feet (Buzby and Rees 2003).

3.3.4.4.2 Forest Management at Donnelly Drop Zone Study Area

Donnelly Drop Zone study area is a medium priority for forest management west of Jarvis Creek and a low priority for forest management east of Jarvis Creek during 2002-2006. The actual Donnelly Drop Zone, however, is high priority, as the drop zone must be maintained free of trees.

The Donnelly Drop Zone site consists of 254 acres of commercial forest land. The white spruce forest types comprise 254 acres and 432,050 cubic feet (Buzby and Rees 2003).

3.3.4.4.3 Forest Management at North Texas Range Study Area

North Texas Range study area has a medium priority for forest management during 2002-2006.

The North Texas Range site consists of 255 acres of commercial forest land. The white spruce forest types comprise 84 acres and 142,880 cubic feet. Birch and aspen forest types account for 22 acres and 17,290 cubic feet. White spruce, birch, and aspen mixed forest types account for 149 acres and 141,250 cubic feet (Buzby and Rees 2003).

3.3.5 THREATENED OR ENDANGERED SPECIES AND SPECIES OF CONCERN

3.3.5.1 Threatened or Endangered Species

The USFWS (1999) has defined the following categories for listing of endangered species in the United States:

- **Endangered** – Species is in danger of extinction throughout all or a significant portion of its range.
- **Threatened** – Species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
- **Proposed** – Species formally proposed for listing in the *Federal Register* as endangered or threatened.
- **Candidate** – Sufficient information exists on biological vulnerability and threat(s) to a species to support proposals as threatened or endangered.
- **Delisted** – Species has been removed from the list of threatened or endangered species. The USFWS will monitor these species for at least five years following delisting.

Federally listed (threatened, endangered, and delisted) plant and animal species in Alaska are presented in the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2,* Appendix E. No Federally listed, proposed, or candidate threatened or endangered species have been found on DTA or USARAK lands (USARAK 2002b,c), but there are a number of rare species (refers to plants, see Table 3.3.4.a) or priority species (developed by USARAK for each installation based on conservation issues or importance as game species) (USARAK 2002b).

The Appendix contains a copy of a letter from the USFWS confirming that no Federally listed species reside or breed on Army lands in Alaska, and that consultation under Section 7(a)(2) of the Endangered Species Act, 16 USC 1536(a)(2) is not required. Although the American peregrine falcon (*Falco peregrinus anatum*) was de-listed as an endangered species in 1999, the USFWS requests consultation on any projects that may hinder their recovery. The installation is within their breeding range, but their actual presence is unknown. They are known to nest within a few miles of the northwestern corner of DTA East (Ritchie and Rose 1998). Proposed activities will have no effect on the recovery of the peregrine falcon in this area.

3.3.5.2 Species of Concern

The state of Alaska has a cooperative agreement with the AKNHP to identify "species of concern." Plants considered species of concern are vulnerable to extirpation at the global or state level due to factors such as restricted geographic range, small population size, low population density, specialized habitat requirements, loss of habitat, or extreme sensitivity to habitat disturbances (Alaska Natural Heritage Program 2004). This list also considers rare vascular plants that may be imperiled but require further analysis (Table 3.3.4.a).

The state of Alaska also maintains a list of sensitive species, endangered species, and species of special concern for wildlife (See the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2,* Appendix E). State listed species are not afforded the same legislative protection as Federally listed species (ADF&G 1998b). Animals may not be imperiled, but, because of their status, require further analysis. The AKNHP monitors and evaluates these species (Alaska Natural Heritage Program 2004).

By definition, a species of special concern is any species (or subspecies) of fish or wildlife, or population of mammal or bird native to Alaska, that has entered a long-term decline in abundance, or is vulnerable to a significant decline due to low numbers, restricted distribution, dependence on limited habitat resources, or sensitivity to environmental disturbance. The list of species of special concern is an administrative listing established (in May 1993 and amended in October 1998) by the Commissioner of the Alaska Department of Fish and Game (ADF&G 1998b).

3.3.5.2.1 Vegetation

Conservationists in Alaska have become increasingly aware of the important role that rare plants and rare plant communities play in the maintenance of biological diversity. Given the vastness of the Alaskan landscape, the botanical profile in many areas is often poorly understood and land management agencies, including the Army, should survey, monitor, and conserve rare plants. The AKNHP helps agencies track rare plants. Moreover, the designations of rare, endangered, and species of concern are the same as with wildlife and fisheries.

The AKNHP's vascular plant tracking list is updated regularly, and currently contains 18 species of concern that also occur on DTA. The 1999 floristic survey of Fort Greely (as DTA was then named) is the basis for the DTA list (Racine et al. 2001) that is compared to the AKNHP list.

Two plant species of concern are ranked in DTA's short-list of species of concern for ecosystem management (See *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2,* Appendix E). *Carex sychnocephala* is rare and critically imperiled in Alaska. *Dodecatheon pulchellum ssp. pauciflorum* is imperiled in Alaska, although the taxonomy of this subspecies is questionable. See Section 3.3.4, *Vegetation*, for additional detail for each alternative study area.

3.3.5.2.2 Wildlife and Fish

Federal designations for animal species follow the same rankings as the plant species: endangered, threatened, proposed, candidate, and de-listed. Listed species are managed and monitored by the USFWS. There are no known Federally endangered or threatened species on DTA.

The state of Alaska also maintains a list of sensitive species, endangered species, and species of special concern for wildlife (See the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2,* Appendix E). Although species on this list may overlap those on the Federal listing, the state listed species are not afforded the same legislative protection (ADF&G 1998b). Animal species may be listed because their status requires further analysis, and the AKNHP monitors and evaluates these species (Alaska Natural Heritage Program 2004).

State and/or Federal species of concern and sensitive species at DTA include the olive-sided flycatcher, Townsend's warbler, gray-cheeked thrush, blackpoll warbler, American osprey and American peregrine falcon. Suitable nesting habitat for peregrine falcons occurs along the bluffs of the Little Delta River on the western boundary of DTA and along the Delta River bluffs (USARAK 1999a, 2002e, Anderson et al. 2000, Mason 2004). Habitat and management concerns are listed in Table 3.3.5.a. See Section 3.2.6 *Wildlife and Fisheries* for additional detail for each alternative study area.

Table 3.3.5.a Species of Concern and Sensitive Species Found on DTA

Species	Habitat	Management Concerns
Olive-sided flycatcher *(Contopus cooperi)*	Coniferous forest or mixed forest	Population decline throughout breeding range. Possible impacts from fire suppression in breeding range. Inadequate monitoring in Alaska, Canada, and along migratory route (Altman and Sallabanks 2000).
Townsend's warbler *(Dendroica townsendii)*	Mature coniferous forests (white spruce)	Habitat loss and fragmentation are indicated as the major threat to survivorship of this species. Inadequate population monitoring in Alaska, Canada, and along migratory route (Wright et al. 1998).
Gray-cheeked thrush *(Catharus minimus)*	Shrub thickets, riparian areas, and coniferous forests	Population susceptible to habitat alteration in wintering areas; risk of electrical tower collision mortality during migration (Lowther et al. 2001).
Blackpoll warbler *(Dendroica striata)*	Riparian woodland or coniferous, deciduous, or mixed forest	Documented population decline, possibly caused by tropical deforestation. Inadequate monitoring in Alaska, Canada, and along migratory route (Hunt and Eliason 1999).
American osprey *(Pandion haliaetus)*	Riparian areas	Inadequate monitoring of Alaskan populations. Susceptible to disturbance during May-June nesting period that can cause abandonment of young. Adversely affected by stream or waterway alterations, specifically those that reduce fish populations or visibility in areas traditionally used as feeding areas. Susceptible to egg thinning by pesticide contamination (VanDaele 1994).
American peregrine	Mountain	Recovered and delisted in 1999 from Federal list of

falcon *(Falco peregrinus anatum)*	ranges, river valleys, and coastlines	endangered and threatened species. Five year monitoring period will determine long-term success of recovery.

Source: ADF&G 1998b

3.3.6 SOCIOECONOMICS

3.3.6.1 Alaskan Demographics

Table 3.3.6.a compares pertinent demographic characteristics of Alaska to the nation as a whole. Alaska has the smallest population, per square mile, in the country, at 1.1 persons per square mile, in comparison to the national average of 79. Alaska also exhibits slightly higher population growth than the national average, as the Alaskan economy has generally performed well since the recession of the mid-1980s. Alaska is a "younger" state, with a higher proportion of younger individuals, as well as less than half the national average of individuals over age 65. The harsh environment discourages retirement, but relatively attractive employment compensation attracts working-age individuals. Alaska has a lower proportion of both white and black persons, as 15.6% of the population is Alaska Natives. It also has a lower proportion of females.

A large disparity exists between those populations living "in the bush" (off the road system) and those living on the road system, a primary distinction for communities in Alaska. Generally speaking, income, education, public services and employment levels are lower in the bush, and poverty levels are higher. Utility systems in the bush, particularly wastewater treatment, are expensive, inferior, and/or nonexistent. In bush communities, subsistence harvesting of fish and game plays a much more important role in the economy and culture. It is difficult to place a dollar value on these subsistence activities, and these communities tend to reject any market evaluation of them. These communities are off the road system and generally lie outside the social and economic regions of influence for military activities.

Table 3.3.6.a State of Alaska and United States Demographic Data for 2000

Demographic	Alaska	USA
Population, 2001 estimate	634,892	284,796,887
Population percent change, April 1, 2000 to July 1, 2001	1.30%	1.20%
Population, 2000	626,932	281,421,906
Population, percent change, 1990 to 2000	14.00%	13.10%
Persons under 5 years old, percent, 2000	7.60%	6.80%
Persons under 18 years old, percent, 2000	30.40%	25.70%
Persons 65 years old and over, percent, 2000	5.70%	12.40%
White persons, percent, 2000	69.30%	75.10%

Demographic	Alaska	USA
Black or African American persons, percent, 2000	3.50%	12.30%
American Indian and Alaska Native persons, percent, 2000	15.60%	0.90%
Asian persons, percent, 2000	4.00%	3.60%
Native Hawaiian and Other Pacific Islander, percent, 2000	0.50%	0.10%
Persons reporting some other race, percent, 2000	1.60%	5.50%
Persons reporting two or more races, percent, 2000	5.40%	2.40%
Female persons, percent, 2000	48.30%	50.90%
Persons of Hispanic or Latino origin, percent, 2000	4.10%	12.50%
White persons, not of Hispanic/Latino origin, percent, 2000	67.60%	69.10%
High school graduates, persons 25 years and over, 1990	280,185	119,524,718
College graduates, persons 25 years and over, 1990	74,497	32,310,253
Housing units, 2000	260,978	115,904,641
Homeownership rate, 2000	62.50%	66.20%
Households, 2000	221,600	105,480,101
Persons per households, 2000	2.74	2.59
Households with persons under 18, percent, 2000	42.90%	36.00%
Median household money income, 1997 model-based estimate	$43,657	$37,005
Persons below poverty, percent, 1997 model-based estimate	11.20%	13.30%
Children below poverty, percent, 1997 model-based estimate	16.20%	19.90%

Source: U.S. Bureau of the Census, Year 2000

3.3.6.2 Alaskan Economic Activity

Table 3.3.6.b depicts the largest employers in Alaska. This list includes only four private sector firms. The military is the largest single employer, with total employment (uniformed and non-uniformed) exceeding 24,000 statewide.

Table 3.3.6.b Alaska's Top Ten Public and Private Industry Employers for 2001

Employer	Number of Employees
Uniformed Military	17,802
Federal Government	16,800
State of Alaska	16,152
University of Alaska	6,344
Anchorage School District	6,293
Providence Hospital (Anchorage)	3,369
Safeway/Carrs	3,252
Municipality of Anchorage	2,950
Fred Meyer	2,262
Wal-Mart/Sam's	2,178

Source: Alaska Department of Labor and Workforce Development 2001; Fried 2002.

Alaska's average monthly employment and earnings, by standard industrial classification, is illustrated in Table 3.3.6.c. While these statistics do not normally include the uniformed military, as they do not participate in the unemployment compensation program, they have been added (in bold) at the bottom of the table, to allow comparisons.

Table 3.3.6.c Alaska Average Monthly Employment and Earnings by Industry Classification for 2000

Industrial Classification	Average Monthly Employment	Average Monthly Earnings ($)
Total		
All Industries	280,693	2,893
Private Ownership	208,475	2,775
Government	72,218	3,232
By Industry		
Agriculture, Forestry and Fishing	1,618	2,178
Mining	10,140	7,198

Industrial Classification	Average Monthly Employment	Average Monthly Earnings ($)
Construction	14,088	3,924
Manufacturing	13,923	2,677
Transportation, Communication and Utilities	27,484	3,676
Total Trade	57,525	1,861
Finance, Insurance and Real Estate	11,524	3,046
Services	71,975	2,304
Federal Government	17,139	4,035
State Government	22,152	3,161
Local Government	32,927	2,862
Uniformed Military	**17,802**	**3,464**

Source: Alaska Department of Labor and Workforce Development 2001; USARAK Public Affairs Office 1995-2002.

If uniformed military are included in the analyses, total government employment in Alaska exceeds 90,000 – over 30% of all jobs. The most significant other "base" industries (those which fuel economic growth through the export of goods and services) are mineral extraction (oil in particular), fisheries, tourism and government. The other sectors are secondary industries; such as services, construction, trade, transportation, communication, utilities, and finance; consequent to the "base" industries in Alaska, and are not a direct ("exporting") source of economic activity.

As the state owns nearly 100 million acres of land, it derives over 80% of its revenues through resource extraction on state lands. Alaska is the only state with no state sales tax, income tax, or individual property tax. Residents, in fact, earn a yearly dividend (from the state) from the earnings from excess oil revenues placed in a "Permanent Fund," which has grown to over $25 billion. The state uses oil revenues to fund public expenditures, the largest being education. It is recognized that, although oil extraction is the original source of these revenues, the Alaskan economy has come to rely on subsequent state expenditures as an additional economic "base" industry.

Total gross state product was $27 billion in 2000, primarily attributable to mining (which includes oil extraction) at $6 billion. The military contribution was $1.2 billion, roughly comparable to the contributions of tourism and commercial fishing.
Tourism, a major industry in Alaska, is estimated at approximately $1.3 billion in 2001. These visitors include business, mixed business and pleasure; visiting friends and relatives; and pure pleasure/vacation travelers. The great majority of visitor expenditures are as tourists. Logging and timber processing, while important, has been declining for a decade, and currently supports only 1,500 employees.

Alaska has exhibited some 13 consecutive years of economic growth and registered the second lowest level of unemployment in its history in 2001. A more balanced, diverse economy has enabled Alaska to escape the wild "booms and busts" of previous history. Presently, oil markets remain robust and a new natural gas pipeline is being planned.

3.3.6.3 Description of Southeast Fairbanks Census Region and Donnelly Training Area

DTA is located within the Southeast Fairbanks Census Area. Most of the area is unincorporated, and is not a well-defined region, in terms of political, economic or social boundaries. For census purposes, this Southeast Fairbanks area includes the region surrounding the Alaska Highway between the Fairbanks North Star Borough and the Canadian border.

Doyon, Ltd., serves as the regional Alaska Native for-profit corporation for this area that is subject to the Alaska Native Claims Settlement Act (ANCSA). The *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2,* Appendix E, lists village corporations within the Doyon region. TCC is the Alaska Native non-profit corporation for this area, charged with advancing tribal self-determination and enhancing regional Native unity. TCC works towards meeting the health and social service needs of more than 15,000 Alaska Natives in Interior Alaska. For further discussion of Alaska Native communities located near DTA, see Section 3.3.7.1.1, *Proximity and Community Information*.

The non-native community of Delta Junction is the closest community directly affected by DTA activities. At one time, Fort Greely was the largest single employer in the region, stationing some 300 non-uniformed personnel (in addition to uniformed personnel), prior to its transfer to the Space Missile Defense Command (SMDC). As a part of Base Re-Alignment and Closure (BRAC) in the 1990s, the number of uniformed military personnel at DTA was dramatically reduced, troops were transferred to FWA, and troops are now transported (from Fairbanks and Anchorage or other DoD installations) to conduct training exercises on DTA. In 2000, there were only 13 uniformed personnel and 100 non-uniformed personnel in residence at DTA.

The aggregate loss of uniformed and non-uniformed personnel proved a dramatic recent change to the local economic region. Residents made strenuous efforts to attract a replacement industry, and DTA employment was only recently rejuvenated through the new projects underway by SMDC, supporting the ground-based missile defense system.

3.3.6.3.1 Demographics

Delta Junction's racial profile, in Table 3.3.6.d, indicates a higher proportion of white individuals and a lower proportion of Alaska Native individuals, when compared to statewide averages. This area also exhibits a smaller proportion of black or Hispanic persons.

Table 3.3.6.d Delta Junction Population Profile for 2000

Population by Race	Number	Percent
Population in 2000	840	100
White	768	91.0
Alaska Native, or American Indian	34	4.0

Population by Race	Number	Percent
Black or African American	9	1.0
Asian	8	1.0
Hawaiian Native	0	0.0
Other Race	1	0.1
Two or More Races	20	2.0
Hispanic Origin (Any Race)	7	1.0
Not Hispanic (Any Race)	833	99.0

Source: Alaska Department of Community and Economic Development 2002

The age profile of Delta Junction contrasts with Alaska, as a whole, and Fairbanks and Anchorage, as there is a larger proportion of older individuals – twice the proportion over age 62. The median age of 36 contrasts to that of Fairbanks, which is at 29 and Anchorage, which is at 32. Also, there is a slightly higher proportion of males to females.

3.3.6.3.2 Housing, Social and Public Services, and Public Education

Previous DTA manpower reductions created surplus housing and depressed property values. Some 26% of houses were vacant according to the 2000 Census, a situation that has recently reversed as a consequence of SMDC activities. Home values and rental incomes were substantially lower in 2000, but have rebounded, and now exceed previous levels. A small proportion of homes have incomplete plumbing or kitchen facilities, and wood heat is more common.

Because Delta Junction is a small and dispersed population, it does not have the public facilities that are available in larger metropolitan areas.

While some medical services are provided by the Delta Junction Family Medical Center, including emergency care, most medical services are obtained through Fairbanks.

The Delta School District exhibits a somewhat higher student/teacher ratio and lower expenditures per student than Fairbanks and Anchorage. With a lower tax base, the district cannot fully supplement state educational expenditures, and, as result, less is spent per student.

3.3.6.3.3 Regional Economic Activity

Income and poverty data displayed in Table 3.3.6.e indicate a substantially lower per-capita income and higher poverty level for Delta Junction.

Table 3.3.6.e Delta Junction Region Income and Poverty Statistics for 2000

Per Capita Income	$19,171
Median Household Income	$43,500
Median Family Income	$58,250
Persons in Poverty	163
Percent of Population Below Poverty Level	19.4%

Source: Alaska Department of Community and Economic Development 2002

Given Department of Labor privacy regulations, insufficient data exists to produce tables of employment and income for the Delta Junction community. As a result, the entire Southeast Fairbanks Census Area must be used to assess local conditions. Approximately 40% of total jobs in the census area are governmental. While uniformed military statistics are not included in labor publications (as they do not participate in unemployment compensation programs), this category has been added (in bold) to Table 3.3.6.f.

The average monthly earnings in the Southeast Fairbanks Census region in year 2000 were $2,559. The earnings for all Fort Greely personnel (mostly non-uniformed) on post at Fort Greely averaged $4,441. In the previous year, prior to significant reductions in uniformed employees at Fort Greely, military payroll averaged $3,041, still 20% higher than the census area, in general.

Table 3.3.6.f Delta Junction Region Average Monthly Employment and Earnings Statistics for Year 2000

Industrial Classification	Average Monthly Employment	Average Monthly Earnings ($)
Total		
All Industries	1,600	2,559
Private Ownership	976	2,006
Government	624	3,423
By Industry		
Agriculture, Forestry and Fishing	3	*
Mining	18	*
Construction	39	2,529
Manufacturing	21	*
Transportation, Communications and Utilities	237	3,628

Industrial Classification	Average Monthly Employment	Average Monthly Earnings ($)
Total Trade	340	*
Finance, Insurance and Real Estate	14	1,733
Services	305	1,340
Federal Government	272	3,867
State Government	124	3,705
Local Government	228	2,739
Uniformed Military	**13**	**1,979**

* Data not available

Source: Alaska Department of Labor and Workforce Development 2001; USARAK Public Affairs Office 1995-2002.

Past economic activity attributable to DTA is presented in Table 3.3.6.g.

Table 3.3.6.g Socioeconomic Impacts of Donnelly Training Area for Year 2000

Uniformed Personnel	13
Non-uniformed Personnel	100
Annual Total Payroll	$12,000,000
Non-personnel Expenditure	$13,500,000
Total Annual Employment Impact Including Multiplier	496
Total Annual Dollar Impact Including Multiplier	$50,500,000

Source: USARAK Public Affairs Office 1995-2002

These staffing and employment levels are increasing slightly as a result of Army transformation. Beneficial economic impacts are expected from maintenance and construction activities associated with mission-essential projects, providing contractual employment and material purchases. The projected program amount for DTA is estimated at $68 million. While these expenditures would provide an incremental benefit to the local economy, the majority of the impact, based on funds received, would be felt in the Fairbanks area. There is only minimal stationing of personnel at DTA, although some additional support personnel are expected. Transformation impacts to the local regional economy will be small, but beneficial. Increased levels of training exercises will decrease recreational access to USARAK training lands. Deployments to DTA (from FRA and FWA) for training purposes may incorporate both road and air transport and would be expected to increase in size and frequency, temporarily elevating noise and traffic congestion in the Delta Junction area.

Increased Army transformation deployments to DTA are likely to produce a small, stimulating effect on the Delta Junction economy. A few incidental full-time annual employment equivalents may be produced in the Delta Junction area, as a result.

Table 3.3.6.h contains a summary of Army transformation.

Table 3.3.6.h Activities Under Transformation

Activity Group	Transform with New Infrastructure and Airborne Task Force[1]
Stationing	
Total Personnel	7,912
FWA	5,407
FRA	2,505
Training	
Mission	New SBCT and Airborne Task Force mission
Live-Fire Training	
Impact Areas (acres)	No change (281,093)
Annual Total Munitions (rounds)	17,204,842
Maneuver Training	
Maneuver Space (km^2 days)	138,300
Maneuver Impact Miles	161,300
Maneuver Impact Miles Capacity	
Summer	373,284 (No change)
Winter	8,661,642 (No Change)
Deployments	
Platoon	
FWA-YTA	160
Company	
FWA-DTA	40
FRA-DTA	16
Battalion	
FWA-DTA	4
FRA-DTA	2
Total Unit Deployment Miles Per Year	1,009,600

[1]Numbers indicate end-state totals.

As indicated, deployments (training at DTA) will increase substantially under transformation, but will remain far below previous (pre-BRAC) levels of continuous activity at DTA. As soldiers will be stationed as part of defined exercises, their impacts will likely be incidental and minimal.

Table 3.3.6.i presents a summary of socioeconomic impacts for ongoing Army transformation, for DTA (USARAK 2004a).

Table 3.3.6.i Additional Socioeconomic Impacts for Delta Junction[1]

Socioeconomic Impact	Transform With New Infrastructure and Airborne Task Force
Delta Junction (DTA)	
Regional Economic Activity	Beneficial
Housing	None
Public and Social Services	None
Public Schools	None
Public Safety	None
Recreational Activities	Minor

[1]End-state impacts are listed.

As indicated, impacts of Army transformation are minimal at DTA, and such impacts are beneficial from a social and economic perspective.

3.3.6.4 Military Expenditure Surveys

A detailed survey of FWA personnel was undertaken in the summer of 1998 to ascertain the impact of military payrolls on the local and state economy. According to survey results, FWA personnel spend 69% of their income off-post in the local economy. These results indicate an unusually high proportion of military dollars being spent in the local economy. Total payroll for statewide U.S. Army operations at FWA, DTA, and FRA are about $356.2 million, while the non-payroll expenditures are approximately $294.5 million; totaling some $650.7 million in economic activity for the state of Alaska. The Army, as an industry, is second only to the oil industry in the generation of revenue for the state. The military provides higher average earnings than the tourism industry and provides more stable monthly employment than commercial fishing; industries that are somewhat similar in size.

This survey did establish a link between Army personnel and the visitor industry. At FWA, 37% of survey respondents had visitors during the year. With an average stay of over 15 days, this represents almost 50 days visitation per year for each employee. These visitors engaged in activities that included glacier cruises, the Alaska Railroad, skiing, fishing, hunting, hiking, white-water rafting, renting RVs, or just sightseeing in the local area. Respondents reported spending an average of $816 on their primary tourist activity. In the most recent statewide Alaska visitor survey, an average of $648 was spent in-state per visitor per trip (Northern Economics, Inc. 2002). While exact comparisons cannot be made between these military and statewide surveys, it appears that visitors of military personnel, on average, stayed longer. Using the more conservative $79 per day, numbers from the statewide survey, the FWA employees account for over $16 million in visitor revenues to the state.

3.3.6.5 Recreational Activities: Fishing and Hunting

During previous scoping meetings (on other projects), sporting groups have expressed concern over impacts on outdoor recreation opportunities due to (1) competition with local residents for natural resources and additional pressure on outdoor recreational activities (fishing, hunting, and trapping), (2) the negative influence of military activities on game populations, and (3) restriction of public access to natural resources and recreation. These concerns represent unique social issues in Alaska, and, as result, were analyzed in previous EISs and supporting analyses (USARAK 2004a). Sampling was based on data obtained from the ADF&G 2001 licenses, and fishing and hunting questionnaires were mailed to 2000 fishing, hunting or combined licensees with mailing addresses on or near the primary road systems in southcentral and interior Alaska, which are locations more proximate to the subject military installations. Since access to military lands is controlled and certain species harvest activities are monitored, usage statistics (for some usage) by non-military users were obtained. As interior Alaskan military lands contain a significant portion of accessible hunting, fishing and outdoor recreational resources; economic measures for principal outdoor activities (by both military and non-military outdoor enthusiasts) are reported.

The average survey respondent had 19 years of Alaskan fishing experience (median of 20) and an average of 19.5 (median of 14) days in the field per year; committing a significant portion of their leisure time to fishing and outdoor activities. This is reflected by the amount of personal capital committed to the activity, an average amount (reported by respondents) of $14,323. The breakdown of this investment, by type of equipment, is as follows: aircraft, averaging $72,500, (8.7%); river and air boats $12,813 (28.5%); All-Terrain Vehicle (ATVs) $5,583 (15.7%); and snow machines at $5,565 (17.4%). Surprisingly, the “other” category received the largest number of individual responses at 25.6% with an average of $13,655. Average annual expenditures for fishing related activities were $1,134. Respondents spent an average of 1.8% of their gross income on fishing related activities annually and committed 22% of gross income on capital equipment purchases. While it is difficult to distinguish fishing expenditures from other recreational pursuits, these expenditures are a significant commitment of household resources (USARAK 2004a).

The average hunting respondent had 21.5 years of experience, with a minimum of one year and a maximum of 55. The average respondent had 22.5 days in the field with a minimum of one and a maximum of 150. This respondent sample represents substantial hunting experience, as well as a significant commitment of leisure time to hunting and outdoor activities. For those responding to the survey, the average capital in place was approximately $24,000. The most common form of equipment was an ATV (68% reported having one for hunting) averaging $4,500, snowmachines were reported by 45% of respondents, and 36% reported ownership of a riverboat. Ownership of “other” equipment was reported by 31% and consisted of cabin cruisers, canoes, kayaks, or hunting shacks. Ten percent reported owning airplanes and 2.3% reported airboats. In addition to these capital expenditures, respondents reported spending, on average, $2,300 annually on hunting (median of $1,000). The average respondent spent about 4% of their pre-tax income on hunting or about 5% to 6% of post-tax income, depending on the respondent’s tax bracket (USARAK 2004a).

3.3.7 SUBSISTENCE

Subsistence plays a vital role in the lifestyles of rural Alaskans. In acknowledgement of the importance of subsistence practices to rural Alaska, Title VIII of the Alaska National Interest Lands Conservation Act (ANILCA) provides procedural requirements designed to perpetuate

customary and traditional subsistence activities on Federal land. In addition, ANILCA requires Federal agencies to give rural Alaskans preference in the take of fish and wildlife on Federal lands when resources are scarce (16 USC §3114).

Subsistence activities are important to rural, remote areas that generally have less infrastructure and development, with little or no opportunity to purchase or receive commercially available resources such as food and other supplies. Subsistence resources have great nutritional, economical, cultural, and spiritual importance in the lives of rural Alaskans. Federal law recognizes that access to subsistence resources is essential to recognized subsistence activities such as hunting, fishing, and trapping -- as well as the harvesting of non-game resources such as plants and berries.

Subsistence take of resources occurs for a number of reasons. Subsistence users often do not have ready access to commercial sources of food and supplies on a regular basis. Subsistence is also an intrinsic element of traditional and cultural practices of rural Alaskans. For residents of Alaska Native villages, there are essential cultural and spiritual values attached to subsistence hunting and fishing. Subsistence harvest often involves a community effort, as some residents will harvest food for others in the community, as well as for themselves. For example, 60% of rural households harvest game while 86% of rural households consume harvested game (ADF&G 2000). This widespread sharing of foods reflects core cultural beliefs.

Subsistence practices depend upon the availability and accessibility of customary useful subsistence resources. The section of DTA being considered for the proposed action possesses a wide range of plants, animals and fish suitable for regional subsistence activities. The type and availability of vegetation are discussed in detail at Section 3.3.4, *Vegetation* of this EIS; and the types and availability of wildlife and fish are discussed in Section 3.2.6, *Wildlife and Fisheries*. Because many recreational users of DTA engage in gathering of resources important to subsistence (i.e., berries, fish and fowl), the factors governing recreational access to various areas of DTA (as described in Section 3.3.8, *Public Access and Recreation*) are relevant to the issue of subsistence access.

3.3.7.1 Subsistence Topics

3.3.7.1.1 Proximity and Community Information

DTA is situated within Federal subsistence management unit (or GMU) 20. GMU 20 is subdivided into six very large subunits. DTA East is in subunit 20D, and makes up approximately 2.5% of the subunit. Federal subsistence management regulations apply to all of GMU 20 (Appendix, Figure 3.m). Immediately south of DTA East, and running along the length of the Richardson Highway to the town of Glennallen, are vast tracks of Federal land. Much of this Federal land is very similar to that found in DTA East, and is managed to allow a subsistence harvest preference for large game animals. The close proximity of these lands to a major public highway also offers ready access to game and plant resources.

Where resources are deemed limited in sections of Federal land, rural Alaska Natives and non-Natives are afforded priority consideration to receive permits to take such limited resources. To qualify for priority consideration, individuals must have their primary, permanent residence in a rural area. Under Federal subsistence regulations, all communities and areas in Alaska are considered rural with exception of the following:

- Adak
- Municipality of Anchorage
- Fairbanks North Star Borough
- Homer area (Homer, Anchor Point, Kachemak City and Fritz Creek)
- Juneau area (including Juneau, West Juneau and Douglas)
- Kenai area (Clam Gulch, Kalifonsky, Kasilof, Kenai, Nikiski, Salamantof, Soldotna and Sterling)
- Ketchikan area (including Ketchikan City, Clover Pass, North Tongass Highway, Ketchikan East, Mountain Point, Herring Cove, Saxman East, Pennock Island and parts of Gravina Island)
- Seward area (Seward and Moose Pass)
- Valdez
- Matanuska-Susitna area (including Palmer, Wasilla, Sutton, Big Lake, Houston and Bodenberg Butte)

Regional populations with recognized subsistence interests (rural status) on USARAK lands include Healy Lake Village, Village of Dot Lake, Native Village of Tanacross, Native Village of Tetlin, Northway Village, Delta Junction, Big Delta, Deltana, and Dry Creek (Appendix, Figure 3.a). Data gathering on subsistence activities on (and around) USARAK lands is currently on-going. The following sections describe the proximity, community, and resources use for several communities near the proposed alternative sites.

Healy Lake Village - The Healy Lake archaeological record indicates that a site within the Healy Lake Village, provides the best evidence of the Athabascan tradition within the state of Alaska, representing perhaps 11,000 years of continuous occupation, based on radiocarbon chronology (Cook 1969, Griffen 1990).

The current community of Healy Lake is located about a half mile from the traditional site of the old village, and is inhabited by the relatives of Athabascan Indians who have resided there since at least 1910 (Callaway and Miller-Friend 2001). This community was heavily impacted by an epidemic in the mid 1940s that killed many residents, and a resurgence population began in the 1980s (Callaway and Miller-Friend 2001).

The bulk of the Healy Lake diets come from wildlife resources. Accessible by an ice road in winter, and by plane or boat in summer, Healy Lake has no store, few amenities, and very little employment. Thus, the residents live a subsistence lifestyle (Calloway and Miller-Friend 2001).

Residents of Healy Lake Village briefly discussed their use of DTA and surrounding areas for subsistence activities during a Government-to-Government meeting that was held in the village on August 28, 2002. USARAK personnel learned that villagers trap animals at the bottom of Donnelly Dome and that Healy Lake Village people are dependent on the game that comes from Donnelly Dome. Such game includes both caribou and sheep migrations. These statements will undergo further analysis as part of an effort to study TCPs on military lands (see Section 3.2.7.3, *Traditional Cultural Properties*).

Village of Dot Lake - The Village of Dot Lake is about 60 miles east-southeast of Delta Junction, along the Alaska Highway. Most of the village's historic subsistence harvest areas end at the Gerstle River (Marcotte 1991). Dot Lake was used as a seasonal hunting camp for Athabascans from George Lake and Tanacross (Alaska Department of Community and Economic Development 2002).

73.7% of the 37 inhabitants (State Demographer 2003) are Alaska Native or part Native. The Native Village of Dot Lake is a traditional Upper Tanana Athabascan village located two-tenths of a mile southeast of the highway. During the 2000 U.S. Census, there were 25 total housing units. Eight residents were employed. The median household income was $16,250, per capita income was $7,476, and 19.05% of residents were living below the poverty level. Employment in the area is limited to the village council, TCC and the school. Local residents sell parkas, moccasins, beadwork and other handicrafts. In the summer, the BLM hires firefighting crews. Subsistence activities are particularly important; and moose, ducks, geese, ptarmigan, porcupines, caribou, whitefish, and other freshwater fish are utilized. Salmon are primarily obtained from the Copper River area, where a number of residents have extended families.

Supplies are brought into Dot Lake by truck or bus. Regular bus service to Fairbanks and Delta Junction are available. Cars, trucks, snowmachines and ATVs are used for local transportation. Dot Lake is not accessible by water, since the Tanana River is over two miles away. A few residents own riverboats, which they use for fishing and hunting.

As wage employment opportunities are limited in Dot Lake, residents rely heavily on the local harvest of wild food. In a study that addresses the use of natural resources by the current residents of Dot Lake, Gayle Martin states that Dot Lake residents participate in a wide variety of resource harvest activities, including hunting for moose, caribou, sheep, black bear, grizzly bear, spruce grouse, ruffed grouse, willow ptarmigan, rock ptarmigan, snowshoe hare, porcupine, squirrels, and waterfowl; trapping twelve species of furbearers; fishing for four species of whitefish, five species of salmon, northern pike, suckers, lake trout, and Dolly Varden; and gathering seven species of berries, roots, mushrooms, edible greens, birch bark, spruce root and firewood (Martin 1983).

During the 1987 through 1988 period, Dot Lake residents harvested an average of 377.7 pounds of food per household or 114.5 pounds per capita. Moose are an important contributor to the Dot Lake harvest, comprising 34.2 percent of the total edible pounds, while fishing, for all species of fish, resulted in 45.3 percent of the total (Marcotte 1991).

Native Village of Tanacross - Tanacross is located on the south bank of the Tanana River, 12 miles northwest of Tok at Milepost 1324 of the Alaska Highway (Alaska Department of Community and Economic Development 2002).

Tanacross is a traditional Athabascan village with a subsistence lifestyle. The population was 144 according to an estimate by the State Demographer in 2003. Nearly every family depends on subsistence activities for food. Whitefish, moose, porcupine, rabbit, ptarmigan, ducks and geese are utilized. Caribou may be hunted by lottery permit, and some travel to Copper River for salmon each summer (Alaska Department of Community and Economic Development 2002). A study, conducted from June 1987 through May 1988, showed that Tanacross residents harvested an average of 684.9 pounds of food per household or 250.4 pounds per capita. Together, moose hunting and whitefish fishing accounted for 62 percent of the total harvest in Tanacross and salmon fishing accounted for an additional 15 percent of the annual harvest (Marcotte 1991).

Many residents also work during the summer as emergency firefighters, while others engage in trapping or in making Native handicrafts to sell. Employment at the washeteria and clinic is provided by the tribe, which has also formed the profit-making corporation Dihthaad Global Services, LLC (Alaska Department of Community and Economic Development 2002).

Native Village of Tetlin - Tetlin is located along the Tetlin River, between Tetlin Lake and the Tanana River, 20 miles southeast of Tok. It lies in the Tetlin National Wildlife Refuge. The village is not connected by road to the Alaska Highway. 97.4% of the population are Alaska Native or part Native (Alaska Department of Community and Economic Development 2002). Tetlin is inaccessible by road, but many residents own cars, trucks, skiffs and snowmachines for hunting, fishing and hauling wood.

Due to the community's isolation, the residents are able to pursue a traditional Athabascan culture and lifestyle. During the 2000 U.S. Census, there were 55 total housing units, and 13 were vacant (of which 12 are used only seasonally). Seventeen residents were employed. The unemployment rate at that time was 46.88%, although 75.71% of all adults were not in the work force. The median household income was $12,250, per capita income was $7,371, and 48.42% of residents were living below the poverty level. The school, tribe, clinic, store and post office provide the only employment. Many residents engage in trapping or making handicrafts for sale. Members of the community are employed to fight fires for BLM in the summer.

Nearly all families participate in subsistence activities throughout the year. Whitefish, moose, ducks, geese, spruce grouse, rabbits, berries and roots are harvested (Alaska Department of Community and Economic Development 2002). In the 1987 through 1988 period, Tetlin residents harvested an average of 854.1 pounds of food per household or 213.5 pounds per capita. Fishing for whitefish accounted for 49.4 percent of the total harvest, which was the greatest single-resource harvest found in the region. Moose hunting added another 29.7 percent of the total harvest (Marcotte 1991).

Northway Village - Northway Village is located between Nabesna River and Skate Lake, on a nine-mile spur road off of the Alaskan Highway. It lies in the Tetlin National Wildlife Refuge, 42 miles from the Canadian border. It is connected to the Alaska Highway by an unpaved road. Regular buses and truck services are available (Alaska Department of Community and Economic Development 2002).

Northway Village is a traditional Upper Tanana Athabascan community, practicing a subsistence lifestyle. The current population is 95, according to an estimate made by the State Demographer in 2003. 95.3% of the population are Alaska Native or part Native. Traditions such as dancing, crafts, hunting and trapping continue today (Alaska Department of Community and Economic Development 2002).

During the 2000 U.S. Census, there were 39 total housing units, and seven were vacant. Six of these vacant housing units are used only seasonally. Thirty residents were employed. The unemployment rate at that time was 31.82%, although 59.46% of all adults were not in the work force. The median household income was $24,688, per capita income was $10,300, and 25% of residents were living below the poverty level. The tribal office, school, clinic and other local services provide the only employment opportunities in the village (Alaska Department of Community and Economic Development 2002).

Subsistence activities provide most food sources; from moose, rabbit, ptarmigan, ducks, geese, whitefish and berries. Some residents travel to the Copper River for salmon. Families also trap and sell furs, and produce birch-bark baskets, moccasins, mukluks, mittens, hats, and beadwork accessories (Alaska Department of Community and Economic Development 2002). In general, local resource harvesting activities are a continuation of historic patterns, with a slight difference in the seasonal scheduling of moose and caribou hunting, and decreases in harvesting of sheep, marmots, and ground squirrels found in the more remote mountainous habitats of former band

areas. Reestablishment of the local caribou populations likely would coincide with greater use once again (Case 1986). During the 1987 through 1988 time period, Northway residents harvested an average of 1,001 pounds of food per household or 278.0 pounds per capita. Whitefish fishing accounted for the largest portion of the Northway total at 36.0 percent. Moose hunting was the second largest contributor comprising 26.8 percent (Marcotte 1991).

Delta Junction, Big Delta, Deltana, and Dry Creek - The towns of Delta Junction (population 840) and Big Delta (population 749) lie adjacent to DTA at the junction of the Richardson and Alaska highways. These towns are rural and thus qualify for subsistence preference under current law.

Deltana (population 1,570) is a Census Designated Place (unincorporated) and an Election District composed of the populated area east of Delta Junction and DTA, bounded by the Johnson River to the east, the Tanana River to the north, and the Granite Mountains to the south. Deltana residents are also eligible for subsistence preference (Census 2000 website).

The non-native community of Dry Creek (population 128) is approximately 45 miles east-southeast of Delta Junction. According to the Alaska Department of Community and Economic Development (2002), at least 15 adult residents rely on the exploitation of natural resources and a number of Dry Creek residents can be characterized as subsistence hunters/trappers.

Given the close proximity of Federal land to these communities, the traditional and customary practices of the region and the documented recreational practices within DTA, these communities are presumed to look to portions of DTA for subsistence resources. These resources would include game animals, fish and plant materials.

3.3.7.1.2 Resource Availability

Subsistence has been legally defined to include the customary and traditional uses of fish, plant materials and game in all of Alaska's rural areas. Customary and traditional use means a long-established, consistent pattern of use, incorporating beliefs and customs that have been transmitted from generation to generation. This use plays an important role in the economy of the community.

Food is one of the most important subsistence uses of wild resources. However, there are other important uses of subsistence products, such as:

- **Clothing:** Wild furs and hides are still the best materials for ruffs (wind guards), mitts, parkas, kuspuks, clothes lining, and mukluks (winter boots) in many regions.
- **Fuel:** Wood is a major source of energy in rural homes, and is used for smoking and preserving fish and meat.
- **Transportation:** Fish, seals, and other products are used to feed dog teams.
- **Construction:** Spruce, birch, hemlock, willow, and cottonwood are used for house logs, sleds, fish racks, and innumerable other items.
- **Home goods:** Hides are used as sleeping mats. Seal skins are used as pokes to store food. Wild grasses are made into baskets and mats.
- **Sharing:** Fish and wildlife are widely given out to support neighbors who cannot harvest for themselves because of age, disability, or other circumstances.
- **Customary trade:** Specialized products like seal oil are bartered and exchanged in traditional trade networks between communities. Furs sold to outside markets provide an important source of income to many rural areas.

- **Ceremony:** Traditional products are used in funerals, potlatches, marriages, Native dances, and other ceremonial occasions.
- **Arts and crafts:** Ivory, grass, wood, skins, and furs are crafted into beautiful items for use and sale.

Harvesting of non-game resources, such as edible or medicinal plants, is determined by public access (when and where). There are no Federal restrictions on the season, take, and eligibility of rural residents for non-game resources. Refer to Section 3.3.8, *Public Access and Recreation* for access opportunities and restrictions on USARAK lands.

3.3.7.1.2.1 Resource Availability at Eddy Drop Zone Study Area, Donnelly Drop Zone Study Area, and North Texas Range Study Area

A variety of subsistence resources are readily available on DTA. Due to the size and relatively remote location of these areas, natural resources and wildlife populations are generally well preserved. DTA annually hosts a variety of hunting activities, based on access and available big game populations.

All three alternative locations for the proposed BAX and CACTF range complex are within GMU 20D. Customary and traditional use has been determined for hunting of the following species in GMU 20D: black and brown bear, moose, caribou, sheep, beaver, coyote, red fox, hare, lynx, marten, mink & weasel, muskrat, otter, wolf, wolverine, grouse and ptarmigan. Subsistence permits can be obtained for the take of those species with an established open season, which are subject to annual review and changes. At this time there is no Federal subsistence season for moose, caribou, or sheep within 20D. No Federal subsistence priority is afforded to hunting of bison found in the DTA region. The Federal government publishes restrictions on season, take, and eligible rural residents annually.

Federal subsistence priority is given for trapping of the following species in GMU 20D: beaver, coyote, red fox, lynx, marten, mink, weasel, muskrat, otter, wolf and wolverine. Subsistence permits can be obtained for the take of those species with an established open season. Subsistence regulations publish annually set restrictions on season, take, and which eligible rural residents have priority for particular sections of Federal land.

Anadromous fish stocks are not available on the training areas, but other freshwater fish can be harvested. For more information on these resources, see Section 3.2.6, *Wildlife and Fisheries*.

Harvesting of non-game resources, such as edible or medicinal plants, is determined by public access (when and where). There are no Federal restrictions on the season, take and eligibility of rural residents for non-game resources. Subsistence users may access DTA under USARAK's current recreational use policy, as described in Section 3.3.8, *Public and Access Recreation*.

Section 3.3.8, *Public Access and Recreation*, describes access (when and where) to USARAK lands. A description of USARAK's new "call-in" system, USARTRAK, for updated information on public access to USARAK lands can be found in the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2*, Appendix H.

3.3.7.1.3 Resource Use

Federal subsistence regulations (50 CFR Part 100 and 36 CFR Part 242) recognize the city of Delta Junction and surrounding communities as rural. Accordingly, these communities have a

priority consideration for subsistence resources on Federal land. USARAK maintains an interactive relationship with local communities, providing opportunities to the public for use of Army training land. DTA is a large, relatively undeveloped open space; and the associated outdoor activities are perhaps DTA's best attributes in terms of community quality of life.

USARAK manages access to Army lands through a Recreational Access Permit (RAP) required for everyone (16 and over). On FWA and DTA, these permits are free. Permit holders are required to make a phone call to the automated USARTRAK system prior to entering training lands. This allows the permit holder to determine which training areas are open for non-Army use. Training areas are only closed during range operations or other military activities that are incompatible with public use.

3.3.8 PUBLIC ACCESS AND RECREATION

3.3.8.1 Access

The public must obtain permission before entering military lands. Persons must first get a RAP before entering. Using their permit number, interested parties may call the USARTRAK automated check-in phone system, indicating where they will be going. When individuals check in, the latest information on military range closures and construction can be obtained. This information is also listed in weekly bulletins and radio announcements. More information on USARTRAK may be found in the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2,* Appendix H.

DTA, especially on (and around) eastern DTA, is readily accessible. Access roads, including 33-Mile Loop Road, Meadows Road, Dome Road, Old Richardson Highway, and Fleet Street, connect directly to either the Richardson or Alaska highways. Additional access has historically been available through the Fort Greely cantonment area, now managed by SMDC. The cantonment area is no longer available for recreation or general access.

In addition to ground access and roads, much of DTA is available to off-road recreational vehicles (ORRV) and aerial access. ORRV and winter trails exist across both the eastern and western parts of the training area. The 33-Mile Loop Road is one of the more popular trail systems on DTA East. DTA West is accessible in winter when the Delta River is frozen over, or by air or boat in the summer.

3.3.8.1.1 Ground

Ground vehicles include standard cars and trucks. Ground access, on maintained roadways, is allowed on USARAK lands, and is the most popular mode of access. Ground vehicles must obey all Army rules and regulations involving posted speed limits, and are not allowed in restricted areas.

3.3.8.1.2 Boat

Boats are considered those aquatic vehicles that require open channels and waterways to operate; and are allowed in some areas. As boats are already limited to open waterways, only certain areas are suitable for boat use. Boats may not operate in restricted areas, some of which may have waterways flowing through them.

3.3.8.1.3 Off-Road Vehicles

ORRV include those motorized vehicles, such as snowmachines, all-terrain vehicles (three- and four-wheeled), and airboats, that do not require maintained roads or open waterways. ORRV use is allowed on maintained roadways and trails in designated areas. USARAK Regulation 190-13, *Military Police – Enforcement of Hunting, Trapping and Fishing on Army Lands in Alaska* describes the restrictions for DTA. ORRVs are allowed at DTA for hunting, trapping, fishing, and other recreational purposes, provided that they are in compliance with all state and Federal laws and applicable Army regulations. In addition, entrants may not use off-road vehicles to gain access to restricted areas. General guidelines state that, during break-up (time of year when the ground begins to thaw, usually in April or May), all areas are closed to off-road vehicle use. Restriction dates during this time are determined by the USARAK Environmental Resources Department and will be recorded on the USARTRAK system.

ORRV use also varies seasonally. Three and four-wheeled all-terrain vehicles are commonly used ORRVs during the summer, while snowmachine use is popular on Army lands in winter. Off-road vehicles usually stay on clear trails, and snowmachines often use frozen waterways in winter.

ORRVs are prohibited from designated ranges and training areas, and users must check with USARTRAK to determine which areas are open for off-road vehicle use.

3.3.8.1.4 Aerial Access

Aerial access involves small aircraft, such as single-engine planes, and ultralights. Aerial access is allowed over USARAK lands, subject to restricted airspaces and closures. Aerial vehicles are prohibited from landing on restricted areas on USARAK lands. Federal Aviation Administration regulations require the military to generate “Notices to Airmen” when hazards exist to the safe flow of air traffic. USARAK Regulation 350-2 addresses use of restricted airspace over USARAK lands (USARAK 2004b). Further information on airspace use over USARAK posts can be found in Section 3.3.10, *Infrastructure*. Many restricted airspace areas are conditionally available for public aerial access or overflight. If landing is to occur on USARAK lands, a RAP and phone call to USARTRAK system is mandatory.

3.3.8.1.5 Unauthorized Access

Illegal entry, without a valid RAP, and without the use of USARTRAK to indicate locations of interest, is the most common form of trespass, which is often premeditated and deliberate. Such trespass is often the precursor to other illegal activities on ranges, which can either directly or indirectly affect natural resources. In addition, trespass leads to serious safety concerns. Trespass also includes crossing the installation boundary (or the internal boundary of an off-limits area) without approval. Only a small portion of each installation’s boundary is fenced or posted with installation boundary signs. Such posting of the boundary can reduce accidental trespass, but has minimal effect on premeditated trespass; and can only be effective if associated enforcement efforts are included to prevent premeditated and deliberate trespass.

Trespass also includes structures built on USARAK lands without Army approval, such as permanent base camps for hunting and trapping. Such problems were identified as early as 1982. The Army started the Training Area Cleanup Program in 1999 and continues to work to locate these structures, identify their occupants or users, and coordinate the removal of the structures from Army lands.

3.3.8.2 Use Areas

Public use is limited on some Army lands in Alaska. Some areas may be permanently closed to public access, due to specific military activities, and each post can provide a listing and description of such access restrictions within its property.

Temporary recreational use restrictions also exist on USARAK lands. These closures are due primarily to military training exercises on those properties that would conflict with recreational use and could possibly increase risk of accidental injury. In addition, seasonal closures are implemented during freeze or breakup. The Range Control Office for each installation is in charge of temporary training closures. Users are encouraged to call both the Range Control Office and Environmental Resources Department to ensure that lands are available for recreational use. This information is also available through the USARTRAK automated check-in phone system.

Specific use areas may be defined for each installation or training area. Limitations and restrictions on public access also depend on the type of designated military use for each area. Some common incompatible uses of military lands include non-military structures, easements, and leases (USARAK 2002b,c). The four general categories of military land use affecting public access are:

Urban Areas - Public access into urban areas is allowed depending on safety restrictions and military security, and when access does not impair the military mission. Compatible uses include natural resources management, habitat improvement, mineral or vegetative resource extraction, bird-watching, hiking, and skiing. Activities that are incompatible with urban areas include hunting and trapping.

Training areas and non-firing facilities - Public access is allowed on training areas, subject to safety restrictions, military security, or when access does not impair the military mission. Compatible uses may include natural resources management, habitat improvement, hunting, fishing, trapping, bird-watching, hiking, skiing, dog sledding, and off-road vehicle use.

Firing ranges, surface danger zones, and non-dudded impact areas - Public access into firing ranges, SDZs, and non-dudded impact areas is normally disallowed, due to conflicts with the military mission. However, there are times during the year when public use does not conflict with military training, and public access is allowed into these areas. Compatible uses generally include natural resources monitoring, range maintenance, fire prevention and suppression, hunting, fishing, and trapping.

The SDZ associated with the BAX and CACTF will be closed when the range complex is in operation.

Dudded impact areas - Public access into dudded impact areas is prohibited, due to the hazard of UXO. Compatible uses include aerial monitoring of natural resources and military impacts, and prescribed burns, to reduce fire hazards and improve habitat. Incompatible activities include any “on-the-ground” natural resources management, digging, mineral extraction, commercial timber sales, hunting, fishing, trapping, bird-watching, dog sledding, camping, and off-road vehicles of any kind.

Impact areas are those parts of military lands that are used for weapons targeting and firing practice. High hazard (dudded) impact areas are closed to the public. Dedicated impact areas are not permanently restricted, although permission to enter these areas is limited. Impact areas on

DTA are shown in Appendix, Figure 2.e. Information on closures can be obtained from the USARTRAK automated check-in phone system, Range Control, or the Military Police upon entering the post.

A two-mile-wide buffer zone surrounds each impact area, and these buffer zones are closed during firing maneuvers on that impact area. This buffer zone contains the safety fan (i.e., the maximum firing or detonation range) of weapons used against targets within the impact areas. All (or parts of) these buffer zones may be temporarily closed to the public during firing.

USARAK is required to post warning signs near all closed training lands and/or dangerous areas. USARAK Range Regulation 350-2 states that all impact areas will be marked with warning signs, barriers and/or guards. Passing any of these hazard warnings without permission from the Range Control Office is forbidden (USARAK 2004b).

DTA East is predominantly managed as Open Use, with the exception of some isolated wetland areas, as well as the Jarvis Creek channel, which are considered Limited Use areas. The 33-Mile Loop Road runs through this area, with a number of additional trails within the area (Appendix, Figures 2.f and 2.g). Other access west of Richardson Highway includes Windy Ridge and Meadows Loop roads.

Portions of DTA west of the Delta River are primarily designated as impact area. Because of this, most of the central area is Off-Limits. Permanent, dedicated impact areas include Oklahoma, Delta Creek, Mississippi, Washington, and Texas, and the Allen Army Controlled Fire Area. USARAK has revised the designation of the Lakes Maneuver Impact Area, and it is now considered Off-Limits, due to presence of UXO. Modified and Open Use areas exist to the north and south, along the northern boundary of the training area and the foothills of the Alaska Range.

The dedicated impact area on DTA consists of the Lakes Maneuver Impact Area. This parcel covers 75,565 acres, and is situated between the Oklahoma Impact Area and the Washington and Mississippi impact areas along the Delta River. The Texas Range and Washington Range areas, southeast of and adjacent to the Washington Impact Area, cover 8,961 acres to the east of the Delta River. In addition, the Cold Regions Test Center (CRTC) complex at Bolio Lake is off-limits to public access and use.

Warning signs have been placed on DTA, with the majority being west of the Delta River. Eleven gates restrict access along the eastern boundary of the Delta River, and one is located in the north portion of Allen Army Controlled Fire Area. The lands between Meadows Road and the impact area boundary are off-limits and are posted accordingly. Warning sign postage exists on all probable approaches to restricted areas.

3.3.8.3 Recreation

USARAK lands are available for a variety of recreational uses, such as hunting, fishing, trapping, off-road recreational vehicle use, hiking, boating, picnicking, berry picking, bird-watching, skiing, and dog sledding. Due to their acreage, condition, and proximity to population centers, Army lands are popular recreational destinations for Alaska residents. Historic recreational use numbers for DTA are shown in the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2*, Appendix E (USARAK 2004a).

USARAK also provides wildlife viewing opportunities for Soldiers, civilians, Alaska residents, and visitors. Programs include wildlife viewing platforms, nature trails, interpretive signs,

brochures, facilities, audio/visual productions, public presentations, and cooperative publications with local, state, and Federal agencies.

The BRAC process realigned Fort Greely in 1999 and the number of Soldiers and civilians working on post and living in the community were dramatically reduced. Recreation user days decreased with this BRAC action. Recreational use is now increasing due to the construction and manning of the SMDC facility.

A RAP is required for everyone 16 and over before entering Army lands. On FWA and DTA, these permits are free. A phone call to the automated USARTRAK system is then required to check into the training areas of choice. Recreation opportunities are only closed during range operations or other military activities that are incompatible with outdoor recreation.

Statements made by the public indicate that a portion of the local population, beyond that reflected in Army data, access DTA East for a variety of recreation activities. The Army has not been able to substantiate this additional access and use.

3.3.8.4 Hunting

Military lands host numerous game species, such as moose, bear, caribou, bison, and small game. Harvest data indicates a constant, annual interest in access to hunting opportunities on USARAK lands. Hunting data indicate that 21% of the interior Alaska moose harvest, the top large game species, occurs on Army lands. In addition, 2.3% of the interior Alaska caribou harvest and 2.1% of the interior Alaska sheep harvest are on military-controlled lands. Hunters must hold state hunting licenses and follow all Federal and state guidelines while hunting on Army properties.

While specific annual hunter access numbers do not exist for all Army properties, existing DTA access data can be used as an approximate guide for hunting access on Army lands (See the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2*, Appendix E). Before hunting on Army lands nationwide, hunters must first take an approved hunter safety course (as required by AR 210-21, *Army Ranges and Training Land Program*). Similarly, bow hunters must complete a bow hunter proficiency course to hunt on Army lands.

Hunting occurs on DTA lands throughout the year, with a disproportionate amount of use occurring in fall. Most big game seasons begin in August or September. Moose is a popular big game species, and its season starts on or about September 1. The recorded data (indicating hunting use by month) indicates that moose is the most popular game species pursued on DTA (See the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2*, Appendix E). Other hunted big game species include caribou, bison, and bear. More data on wildlife populations on DTA can be found in Section 3.2.6, *Wildlife and Fisheries*. Hunting is allowed on DTA East, within open areas as determined by Range Control.

Most of the moose hunting on DTA East occurs along the east side of 33-Mile Loop Road. This area is a non-permit area, but does have antler restrictions for moose. The open views from ridgelines provide excellent vantage points for hunters. Training Areas 8, 9, 10, 11, 16, 17, 19, and Gerstle River are the only areas on DTA East within GMU 20D that are open for non-permit hunts in September.

The DJMA encompasses most of DTA East (Appendix, Figure 3.m). Hunting restrictions by the state in the DJMA apply only to moose. To hunt moose in this area, one must apply for a permit through the ADF&G drawing process. Only 10 permits are issued through a lottery per year.

Although Texas and Washington ranges, and Washington Impact Area are within the DJMA, the Army does not allow any recreational access to these areas.

State regulations allow black bear hunting year round in GMU 20D, with a harvest limit of three per regulatory year. Black bears may also be taken over a state registered baitstand from 15 April to 30 June. Black Bear baiting is allowed on DTA after registration of the stand with the state of Alaska and USARAK. Some areas may be temporarily closed to bear baiting due to training.

Grizzly (Brown) bear hunting is open from 10 August to 30 June, with a harvest limit of one per regulatory year.

The caribou hunt (bulls) on DTA East is open to residents only through a registration hunt. This season occurs 15 August to 25 August.

Bison hunts are allowed through the ADF&G drawing process. The number of permits issued is based on that year's population estimates and composition.

There is insufficient habitat for Dall sheep on DTA East; thus no hunting occurs. Access through DTA East for Dall sheep hunting in other areas off-post does occur, as the Granite Mountains (to the east of DTA East) are popular for hunting.

3.3.8.5 Trapping

Trapping occurs on military lands in Alaska, and is allowed on DTA. Popular furbearer species for trapping include lynx, beaver, pine marten, fox, and wolves.

Trapping on DTA East requires the registration of traplines with USARAK Conservation Officers. Trapping requires a RAP along with a daily phone call to the USARTRAK system. Trapping records for DTA have been compiled into an annual summary (Reidsma 2001, 2002, 2003).

3.3.8.6 Fishing

Fishing is a popular recreational activity on Army lands. In addition to naturally existing populations of many sport fish, there are a number of stocked lakes on Army lands (Appendix, Figure 3.s). The ADF&G is responsible for maintaining stocked fish populations on military lands. Stocking data can be found in Section 3.2.6, *Wildlife and Fisheries*. Fishing on Army properties requires a RAP, issued by the post on which the fishing will occur, and a daily phone call to the USARTRAK system.

There are 16 lakes on DTA with stocked sportfish populations. Stocked lakes include Bolio, Bullwinkle, Chet, Nickel, J, Doc, Sheefish, Mark, North and South Twin, Rockhound, Luke, Ghost, and No Mercy lakes within the Meadows Road/Windy Ridge Road loop. Weasel Lake, near the southern boundary of the training area, and Koole Lake, in the northwest, are also stocked. Fish stocking data may be found in the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2*, Appendix E.

3.3.8.7 Trail Use

Hiking opportunities exist within all USARAK locations. Hiking is most popular in mountainous or hilly terrain, and is much less popular through lowland and wet areas. Hiking on military lands usually occurs on training and maneuver trails. Few other marked trails exist on Army lands.

DTA contains many trails east of the Delta River. The most common hiking route at DTA is to the top of Donnelly Dome, which is easily accessible from the Richardson Highway. Public access for trail use is allowed with a valid RAP, subject to closures, safety restrictions and military security.

Other popular activities on Army lands include sightseeing, bird-watching, berry picking, skiing, and dog sledding. Many recreational activities are seasonal and occur in brief bursts each year. Records of non-extractive recreational use of military lands are unavailable for most Army lands.

3.3.8.8 Off-Road Recreational Vehicles

ORRVs on DTA include airboats, jet boats, snowmachines, dirt bikes, three and four-wheelers, and four-wheel drive vehicles. ORRVs are used in association with many activities in interior Alaska. These vehicles are primarily used to access hunting, fishing, and trapping areas, and for recreational riding.

3.3.8.9 Resource Use at Eddy Drop Zone Study Area

Approximately 54 miles of old military trails, major access trails, and gravel roads bisect the Eddy Drop Zone study area. The main access route to Eddy Drop Zone study area is an improved gravel road (five miles of which is within the proposed BAX and CACTF footprints). There are about nine miles of secondary, year round gravel trail (33-Mile Loop Road) and a four-mile shortcut within the proposed footprint. 33-Mile Loop Road is the major access trail to training areas in this part of DTA, and to the areas south and east of DTA that are used for recreation. There are also about 37 miles of minor trails in the area, some drivable with an ORRV or during winter, when the ground is frozen, but the rest are overgrown and impassable.

Eddy Drop Zone study area is one of many good locations for blueberry picking and grouse hunting for local residents. The trails and surrounding forests are also used for moose and small game hunting, trapping and dog mushing. The extensive trail network in this area creates easy access, and numerous small ridges or hills provide good overlooks. Most of the Eddy Drop Zone study area footprint is in the DJMA, which restricts moose hunting to 10 permit holders each fall. However, the southeast corner of the proposed BAX and CACTF site lies just outside of this permit-only moose hunting area. Since this is a close and convenient open hunting area outside of the DJMA and to Delta Junction and Big Delta communities, many hunters utilize 33-Mile Loop Road to access the area. The 33-Mile Loop Road area, outside of the DJMA, is probably the heaviest used area for moose hunting on DTA.

Recreational data was kept for three years (1996-1999) by the Military Police prior to BRAC, and information was recorded for general recreation areas. Eddy Drop Zone and 33-Mile Loop Road data show the top recreational activities for those three years were hunting, sight-seeing, ORRV and snowmachine use, trapping, dog mushing, and berry picking (Reidsma 2004).

3.3.8.10 Resource Use at Donnelly Drop Zone Study Area

The Donnelly Drop Zone study area contains 40 miles of existing trails, which, in most cases, are overgrown and not drivable. A four-mile section of 33-Mile Loop Road (also known as 12-Mile Crossing Road) crosses the northern boundary of the proposed BAX and CACTF footprint from the Richardson Highway. It runs east, through Jarvis Creek, and connects to the main trail near Butch Lake. This road is the only access to training areas in this part of post, but is severely degraded and may be impassable in some areas when wet, except in the winter. Hunting for moose, Dall sheep, bears and caribou all occur in the Granite Mountains, and many recreational users access the area by using 12-Mile Crossing Road. An improved gravel road ends just inside the proposed BAX footprint (about 1.5 miles). In the northwest corner of the proposed CACTF area, there are 2.5 miles of trails that are part of a network created for a CRTC test in the 1970s or 1980s.

The Donnelly Drop Zone study area is popular for firewood cutting (following the 1999 Donnelly Flats fire), dog mushing, trapping, and hunting. Hunting is popular within the Donnelly Drop Zone study area, as it is just outside the DJMA, and is easily accessible from the Richardson Highway. The 12-Mile Crossing is also used to access the east side of Jarvis Creek.

Recreational data from DTA (1996-1999) was recorded for two general recreation areas that overlap the Donnelly Drop Zone study area. The top recreational activities for those three years were hunting, sight-seeing, ORRV use, trapping, and berry picking (Reidsma 2004).

3.3.8.11 Resource Use at North Texas Range Study Area

Meadows Road, near the North Texas Range study area, is a maintained, year-round gravel road, four miles of which crosses the middle of the proposed BAX area from north to south. Meadows Road, Windy Ridge Road, and the Old Richardson Highway provide access to the training areas west of the Richardson Highway and north of Donnelly Dome. Windy Ridge Road is a less frequently maintained gravel road that crosses the southern edge of the proposed CACTF area (for approximately two miles). The western one-third of the proposed BAX footprint can be accessed by using OP 8/9 Road, which is an occasionally-maintained gravel road (approximately 4.5 miles long). An additional 31 miles of old military trails crisscross the area, but most of these are either overgrown, impassable, or cross boggy areas (winter trails).

The North Texas Range study area is very popular for recreational use, containing a number of stocked lakes. Grouse hunting, fishing, trapping and wildlife viewing are popular activities. The provided fishing information is from the lakes most likely impacted by the proposed BAX and CACTF location, which are North and South Twin, Mark, Chet, Nickel, J and Ghost Lakes. The top recreational activities for those three years were fishing, sight-seeing, hunting, and camping (Reidsma 2004).

There is anecdotal evidence that fishing pressure on the stocked lakes has increased significantly within the last year, with the large number of transient contract workers. These workers are associated with construction of SMDC facilities, and live within the Delta Junction community (Benner 2004). This may (or may not) continue, depending on future work, and the development of other recreational activities for military and civilian workers at Fort Greely. When Fort Greely was realigned and turned over to SMDC, the bowling alley, movie theatre, swimming pool and other Morale, Welfare and Recreation facilities closed.

3.3.9 ENVIRONMENTAL JUSTICE

In 1994, President Clinton issued Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. This executive order directs each Federal agency to identify and address any disproportionately high and adverse environmental effects of its programs, policies, and activities on minority populations and low-income populations. Environmental effects include effects on human health, cultural resources, and socioeconomics.

The Presidential Memorandum accompanying Executive Order 12898, sent to heads of departments and agencies, specifically recognizes that environmental justice concerns should be identified and addressed under NEPA procedures. Additionally, the DoD Strategy on Environmental Justice requires implementation of Executive Order 12898, principally through compliance with the provisions of NEPA.

In addition, Executive Order 13045, *Protection of Children From Environmental Health Risks and Safety Risks*, requires the identification and assessment of environmental health and safety risks that may disproportionately affect children.

Environmental justice analysis ensures that minority and low-income communities do not bear a disproportionate share of negative environmental consequences resulting from Federal activities. In particular, Executive Order 12898 directs agencies to pay special attention to subsistence issues when dealing with environmental justice, since these communities often rely heavily on hunting, fishing, and gathering for their primary dietary/nutritional needs. Moreover, agencies are reminded to consider the environmental consequences of their actions in the context of cumulative effects stemming from all other activities – past, present, and future – that have impacts on the community. Subsistence is discussed in Section 3.3.7, *Subsistence*.

3.3.9.1 Region of Influence

For purposes of this analysis, demographic research focused on the census area where each alternative is located. In addition, since census areas in Alaska cover broad geographic regions, individual communities in close proximity to the alternative sites were analyzed separately, to identify potential environmental justice issues. The region of influence for environmental justice analysis was established by determining the most geographically far-reaching potential effect, and including encompassed communities in the analysis.

DTA is located in the Southeast Fairbanks Census Area, a large region, and a number of communities are analyzed separately in Table 3.3.9.a. These communities were chosen, based on their inclusion in the ADF&G GMU 20D, to reflect their subsistence ties to this region (Appendix, Figure 3.a and 3.m).

Table 3.3.9.a Minority and Low-Income Percentages for Southeast Fairbanks Census Area Communities

Area	Total Population	Percent Minority	Percent Native	Percent Low-Income
State of Alaska	*636,932*	*30.7*	*15.6*	*11.2*
Big Delta	749	4.5	2.1	30.0
Delta Junction	840	8.6	5.6	19.4
Deltana	1,570	8.4	3.8	15.1
Dot Lake	19	15.8	5.3	5.6
Dot Lake Village	38	76.3	73.7	19.1
Dry Creek	128	0.0	0.0	69.4
Fort Greely	461	34.3	2.0	10.4
Healy Lake	37	73.0	73.0	9.1
Northway Village	95	98.2	95.3	25.0[1]
Tanacross	144	91.5	90.0	33.3[1]
Tetlin	137	97.5	97.4	48.4[1]

Source: Alaska Department of Community and Economic Development 2002

[1]These numbers refer to 'Percent Below Poverty', which is defined as annual income less than $15,134.

3.3.9.2 Minority and Low-Income Communities

The Alaska Department of Community and Economic Development compiled ethnicity and poverty statistics from the 2000 Census. Minority populations are identified using U.S. Census Bureau data, to delineate areas where the percentage of minority individuals exceeds the state average by five percent. Minorities were defined as members of the following population groups: American Indian or Alaska Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic (CEQ 1997b). The issue of environmental justice is considered separately from government-to-government consultations with Alaska Native tribal government entities.

Low-income communities were identified using the 2001 U.S. Department of Health and Human Services Poverty Guidelines for the state of Alaska. Individual census tracts were reviewed to determine the percentage of households (within the census tract) with incomes below the poverty level for Alaska. Communities were defined as low-income if the percentage of households with incomes below the poverty level exceeded the statewide percentage by five percent. The state-wide percentage of households with incomes below the poverty level is 11.2%. Based on census data from 2000, the Southeast Fairbanks Census Area had a population of 6,174. Of that total, 1,297 persons (21%) were minorities and 1,136 persons (18.4%) had incomes below poverty level.

For further community information on Dot Lake Village, Healy Lake Village, Northway Village, Native Village of Tanacross, and Native Village of Tetlin, see Section 3.3.7.1.1, *Proximity and Community Information*.

3.3.9.3 Impacts on Children

According to the Task Force on Environmental Health Risks and Safety Risks to Children, four priority areas of concern regarding children's health and safety are: childhood asthma, unintentional injuries, developmental disorders, and childhood cancer. With these priorities in mind, analysis of potentially disproportionate effects on children from the proposed action will focus on the areas of air quality, water resources and human health and safety.

In accordance with the mandates of Executive Order 13045, training plans and construction site maps, for projects undertaken on DTA, are reviewed to prevent dangerous or hazardous activities from occurring near schools or child care facilities.

3.3.10 INFRASTRUCTURE

This section discusses the current land use, roadway networks and traffic patterns, airfields, airspace and port facilities within the USARAK vicinity.

Existing land use boundaries are defined for major land use categories identified in the USACE Master Planning Instructions. These have been established as the framework for future land use decisions. Each land use category is evaluated against the established criteria to determine compatibilities, constraints and opportunities. Land use categories are assumed to be compatible with adjacent land uses. Table 3.3.10.a lists USARAK land use categories, and the number of acres categorized as such, at DTA.

Table 3.3.10.a Acres of USARAK Land Use Planning Categories

Location	Facilities								
	Trans-portation	Housing	Community	Installation Support	Range and Training Land	Mainte-nance	Outdoor Recreation	Miscella-neous	Total
Donnelly Training Area[1]	0	0	0	0	661,944	0	0	0	661,944

[1] Includes Gerstle River and Black Rapids training areas.

Source: Information based on data in USARAK 1999a,b,c

Land use is further broken down into the following categories: rights-of-way, easements and leases; transportation; housing; community facilities; installation support facilities; training and range facilities; and airspace and airfields.

3.3.10.1 Rights-of-Way, Easements and Leases

Outgrants are installation lands that the Army has granted other entities to use, through a lease or use agreement. USARAK has a total of 126 outgrants, generally in the form of easements, leases, permits, and other grant instruments (Nakata 2001). The Trans-Alaska pipeline transports crude

oil from Prudhoe Bay to Valdez, and the pipeline passes through DTA East. The right-of-way is 50 ft wide, plus a four-foot ground area occupied by the pipeline (USARAK 1999a). Other rights-of-way include natural gas lines (Trans-Alaska Gas System), the Richardson Highway, and various power transmission lines.

3.3.10.2 Transportation

Rapid deployment is a key element of the USARAK mission. Although terrain, climate, and a relatively small population limit Alaska's transportation infrastructure, it is adequate to meet these needs, through deployment capabilities by air, rail, road, and sea (Nakata 2001).

The only transportation resources available to serve DTA and the Delta Junction area are the Richardson and Alaska highways and the Allen Army Airfield. Both two-lane highways are maintained year-round. In addition, a maneuver corridor, connecting the southeastern corner of Tanana Flats Training Area and the northwestern corner of DTA, has been established for training purposes (Nakata 2001). Further discussion regarding traffic impacts can be found in Sections 3.2.5 and 4.2.5, *Human Health and Safety*.

There is no rail service to DTA. The nearest rail service is at FWA or Eielson AFB, about 100 miles to the north. The Alaska Railroad provides a connection to Seward, the nearest port with intermodal capability.

3.3.10.3 Housing

Housing on USARAK installations is organized in the following categories: family housing, enlisted unaccompanied housing, and non-enlisted unaccompanied housing. No family housing, or enlisted unaccompanied personnel housing exists on DTA.

3.3.10.4 Community Facilities

Community facilities is a broad term encompassing facilities that provide a variety of activities, ranging from shopping, banking, education and recreation activities to police, fire protection and health care facilities. No community facilities exist at DTA.

3.3.10.5 Installation Support Facilities

Installation support facilities include range maintenance, vehicle maintenance, administrative support, and supply and storage facilities. It also includes power and heating, water supply, wastewater treatment, and solid waste collection and disposal facilities. One range maintenance building (Beales) is located at DTA.

3.3.10.6 Training and Range Facilities

Range and training land facilities are defined as areas of land or water set aside, managed, and used to conduct research; develop, test, and evaluate military munitions, explosives, other ordnance, or weapon systems; or to train military personnel in their use and handling of weapons systems. USARAK range and training land facilities information is summarized in the Range and Training Land Development Plan (Nakata 2001) and the Army Range Inventory Database.

The number of acres classified as range and training land at USARAK is listed in Table 3.3.10.b. Quality of maneuver lands are described in terms of capability, training requirements (as compared to capacity), and condition.

Table 3.3.10.b Acres of USARAK Range and Training Land Facilities

Post	Small Arms Ranges	Major Weapons System Ranges	Non-Live Fire Ranges	Maneuver Training Areas	Total
Donnelly Training Area	8,539	146,721	4	481,335	636,599

Source: Army Environmental Center 2001a,b

3.3.10.6.1 Training Ranges

3.3.10.6.1.1 Capability

Small arms ranges are semi-permanent or permanent facilities used for small arms weapons firing. Firing fans and/or SDZs are associated with small arms ranges. A small arms SDZ may be permanently designated as a dedicated small arms impact area. Small arms marksmanship ranges are used to qualify or train individual Soldiers on rifles, pistols, sniper rifles, shotguns, and machine guns. Collective live-fire ranges are used for collective training events, such as infantry squad and platoon battle courses, urban assault courses, and aerial gunnery ranges. USARAK small arms ranges meet Army standards (Nakata 2001). Table 3.3.10.c shows acres of small arms facilities managed by USARAK.

Table 3.3.10.c Acres of USARAK Small Arms Range Facilities

Post	Marksmanship	Collective Live Fire	Dedicated Impact Areas	Total
Donnelly Training Area	149	244	8,146	8,539

Source: Army Environmental Center 2001a,b

Major weapons system ranges are semi-permanent or permanent facilities used for major weapons systems, which may utilize potential dud-producing munitions. Firing fans or SDZs and dedicated impact areas are associated with major weapons system ranges. Acres of major weapons system facility types are listed in Table 3.3.10.d.

Table 3.3.10.d Acres of USARAK Major Weapons System Ranges

Post	Marksmanship	Collective Live Fire	Indirect Fire Artillery	Spec. Live Fire	Dedicated Non-Dudded Impact Area	Dedicated Dudded Impact Areas	Total
Donnelly Training Area	8,962	0	41	15	74,565	63,138	146,721

Source: Army Environmental Center 2001a,b

Non-live fire training facilities are used to train Soldiers without the use of weapons, i.e., rappel towers, obstacle courses, nuclear, biological, and chemical chambers, hand grenade qualification ranges, and other facilities not covered under traditional range categories.

3.3.10.6.1.2 Training Requirements vs. Capacity

Based on the analysis conducted in the 2001 Range and Training Land Development Plan (Nakata 2001), USARAK identified a need for sniper ranges and squad and platoon live-fire ranges. This requirement was based on 172nd Infantry Brigade (Separate) (SIB) training requirements. Two sniper ranges and squad and platoon live-fire ranges are currently being constructed to meet the shortfall.

The 2001 Range and Training Land Development Plan analysis also identified a need for major collective ranges for 172nd SIB to meet mission requirements. Shortfalls in the types of ranges, required by current USARAK units to effectively train, are being addressed through the military construction program.

3.3.10.6.1.3 Condition

The condition of USARAK's small arms range facilities is classified as good (Nakata 2001).

The condition of USARAK's major weapons system training ranges is classified as adequate to good, with its impact areas being classified as good. Additionally, natural and cultural resources within major training ranges (including impact areas) remain in excellent condition. Localized impacts from munitions in impact areas occur, but have not significantly changed the overall condition of the ranges. Preliminary data indicate that no contaminants (explosive residue or heavy metals) are migrating outside impact areas (Palazzo et al. 2002, USARAK 2004a).

3.3.10.6.2 Maneuver Training Land

3.3.10.6.2.1 Capability

Maneuver training areas are used to conduct force-on-force maneuver training and situational training exercises. Areas are classified as light or heavy, depending on the type of training they can support. (Note: Lands classified as heavy maneuver areas can also be used to train light forces.) Maneuver training area, are not restricted for light infantry use within Alaska.

3.3.10.6.2.2 Training Requirements vs. Capacity

Maneuver areas are used for tactical movements, movement to contact, relocations, defending assigned areas, establishing new areas of operations, trail construction, mobility and counter mobility operations, reducing obstacles with equipment, and constructing obstacles with equipment. Other types of maneuver training land include bivouac, drop zones, landing zones, and assault airstrips. Acres of training land categories are shown below in Table 3.3.10.e.

Table 3.3.10.e Acres for USARAK Maneuver Training Land Categories

Location	Light	Heavy	Bivouac	Drop Zones/Landing Zones	Assault Air Strips	Total
Donnelly Training Area	401,252	71,736	0	8,205	142	481,335

Source: Army Environmental Center 2001a,b

Range capacity is calculated by multiplying the total number of lanes or firing points for the appropriate range type by the number of iterations per hour; then multiplying the result by the number of hours available per training day (Nakata 2001). For example, an installation has three M16 zero ranges with a total of 150 lanes. The number of iterations per hour is one (60 minutes per iteration), and the available hours per training day is 8. Therefore, the capacity for M16 zero range is 1,200 Soldiers per day to get the Soldier capacity per year.

The capacity for maneuver training areas can be expressed in terms of square kilometer days (km^2 days). This is calculated by converting the number of acres of each maneuverability type by 242 available training days per year.

Training load capacity is a measure of the total capacity of a given parcel of land to support military training. Army Training and Testing Area Carrying Capacity measures training load in terms of maneuver impact miles.

3.3.10.6.2.3 Condition

Land condition is an index of ecological integrity, and is measured in terms of erosion status, vegetative cover, and disturbance. It is expressed in terms of percent, 100% being the best condition and 1% being the worst. Additional land condition information can be found in the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2,* Appendix F.

3.3.10.7 Airspace and Airfields

The definition of airspace includes vertical and horizontal boundaries and time of use. The FAA manages all airspace within the United States, including Alaska. In addition to airspace, the FAA manages the air navigation system, equipment, control towers, radar facilities, and the rules and regulations relating to powered flight. The FAA is responsible for managing the airspace for commercial airliners and air carriers, general aviation, and government agencies, including the U.S. military.

Use of airspace is required for the successful operation of the U.S. military. Some military flight activities are not compatible with civilian uses of airspace, and some military activities potentially conflict with other uses of military airspace. Airspace restrictions are needed within military installations to ensure safety and to avoid possible conflicts of airspace use.

Most military operations are conducted within a designated airspace, where specific procedures are followed to maximize flight safety for both military and civilian aircraft. The designated airspaces include special-use areas including Military Operations Areas (MOA), Restricted Areas, Controlled Fire Areas, Prohibited Areas, Warning Areas, and Alert Areas. Special-use areas that overlie DTA are MOA, Restricted Areas, and Controlled Fire Areas.

MOAs consist of airspace of defined vertical and lateral limits established for the purpose of separating certain military training activities from civilian aircraft operating under instrument flight rules (IFR). Whenever a MOA is being used, nonparticipating IFR traffic may be cleared through a MOA if IFR separation can be provided by air traffic control (ATC). Otherwise, ATC will reroute or restrict nonparticipating IFR traffic. Pilots operating under visual flight rules (VFR) should exercise extreme caution while flying within a MOA when military activity is being conducted. Pilots are encouraged to contact Eielson AFB Range Control on 125.30 MHz for real-time information regarding MOA hours of operation and traffic advisories near DTA.

Restricted areas contain airspace identified by an area on the surface of the earth within which the flight of aircraft, while not wholly prohibited, is subject to restrictions. Activities within these areas must be confined because of their nature or limitations imposed upon aircraft operations that are not a part of those activities or both. Restricted areas denote the existence of unusual, often invisible, hazards to aircraft such as artillery firing, aerial gunnery, or guided missiles. Penetration of restricted areas during periods of active use, without the authorization from Eielson AFB Range Control on 125.30 MHz may be extremely hazardous to the aircraft and its occupants. Restricted areas are published in the *Federal Register* and constitute 14 CFR Part 73. If the restricted area is not active and has been released back to the FAA, aircraft can operate in the restricted airspace without needing a specific clearance for it to do so.

Controlled Firing Areas contain activities, which - if not conducted in a controlled environment - could be hazardous to nonparticipating aircraft. The distinguishing feature of the Controlled Firing Area, as compared to other special use airspace, is that its activities are suspended immediately when spotter aircraft, radar, or ground lookout positions indicate an aircraft might be approaching the area. There is no need to chart Controlled Firing Areas on civilian air charts since they do not cause a nonparticipating aircraft to change its flight path.

Using units schedule maneuver areas/restricted areas with DTA Range Control or the Joint Scheduling Office, 353rd Combat Training Squadron, Eielson AFB. Once scheduled, the appropriate Range Control office includes the dates and times of aircraft operations on the weekly Notice to Airmen that are faxed to the Traffic Management Unit at the FAA Regional Office. If the aircraft would fly in a MOA to get to a restricted area, the unit would schedule that MOA with the Joint Scheduling Office, 353rd Combat Training Squadron, Eielson AFB. Prior to entering and exiting any restricted area, military aircraft are required to monitor and then broadcast intentions to Eielson AFB Range Control. Operating units are required to monitor Range Control while operating inside of a restricted area. Safety procedures are detailed in USARAK Regulation 95-1, *Aviation*.

Buffalo MOA overlays DTA East (Appendix, Figure 2.b). This MOA extends from 300 ft AGL up to but not including 7,000 ft above sea level (MSL).

Allen Army Controlled Firing Area overlies a small portion of DTA East and West on both sides of the Delta River across from Allen Army Airfield.

With the exception of the extreme west and southwest corner of DTA, most of DTA West is within the Restricted Area R2202A/B/C (Appendix, Figure 2.b). The western two-thirds of DTA West, including the Oklahoma and Delta Creek impact areas lie under R2202B. The remainder of DTA West and the western third of DTA East lie under R2202A and includes the Lakes, Mississippi, and Washington impact areas. R2202C overlies R2202A and R2202B. R2202A/B includes that airspace from the surface to 10,000 ft MSL R2202C starts at 10,000 ft. MSL and is unlimited in height. Complete restricted area descriptions can be found in FAA Order 7400.8, *Special Use Airspace*.

At DTA, Allen Army Airfield can support C5/C141 aircraft in winter and C130 aircraft at all other times. Donnelly Assault Strip in DTA East can accommodate rotary-wing aircraft and C130 aircraft as well as most civilian light, single and twin-engine aircraft. DTA West contains three airstrips, Bennet, Sullivan, and Delta Creek Assault Strip. In their current configuration, they can support rotary-wing aircraft and certain fixed wing, single-engine aircraft. In addition, there is a landing strip located in Delta Junction, which supports rotary-wing, fixed-wing single-engine, and certain twin-engine transport aircraft. This airstrip is the base of operations for the state of Alaska Division of Forestry, one air taxi business, guiding services, and a staging area for the nearby Pogo Mine. Black Rapids airstrip, located south of DTA near the Black Rapids Training Facility can accommodate rotary-wing and certain fixed-wing, single-engine aircraft.

3.3.11 PAST, PRESENT, AND REASONABLY FORESEEABLE REGIONAL ACTIONS

In the analysis of cumulative impacts, an agency must evaluate “past, present, and reasonably foreseeable” actions. With respect to Army actions at DTA and their impacts, past and present impacts are adequately addressed within existing NEPA documentation (USARAK 2004a), including those associated with the transformation of the Stryker Brigade and airborne units. “Reasonably foreseeable” actions in the region comprising and surrounding DTA include:

- Expansion of Strategic Missile Defense Command (SMDC) activities - Currently, increased development at Fort Greely, primarily SMDC activities, has been addressed (SMDC 2000) and is currently being debated at a national strategic level.
- Expansion of CRTC activities - These actions include new system test and evaluation (T&E) activities within DTA, including the development of the CRTC Automotive Test Complex.
- Development of a natural gas pipeline - This pipeline might use existing right-of-way for the Trans-Alaska Pipeline or the Alaskan-Canadian highway. This conceptual project is not mature enough to afford adequate analysis for inclusion this EIS, as it is being debated currently.
- Improvements in the railroad system - This potential project may involve extension of rail lines from the Fairbanks area into or through areas near DTA. Conceptual planning for such a project is not mature enough to afford adequate analysis for inclusion in this EIS.
- Increased recreational and tourism activities in the region - There is an existing trend toward increased recreational use and tourism in the immediate vicinity of DTA.
- Pogo Mine - This action is proposed 35 miles northeast of Delta Junction. This is an underground gold mine.

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